RESTORATION PLAN

KENNEDY FLATS

Kootowis, Hospital, Sandhill, Staghorn, Trestle, Trestle S, Indian/Harold, Lostshoe, Salmon

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In Partnership with:

- Alberni Clayoquot Regional District
- Interfor
- Municipality of Tofino
- Municipality of Ucluelet
- Tofino Business Association
- Ucluelet Chamber of Commerce
- Ahousaht First Nations
- Hesquiat First Nations
- Tla-o-qui-aht First Nations
- Ucluelet First Nations
- Aquaculture Association
- Tofino Stream Keepers

EXECUTIVE SUMMARY

Restoration Plans are developed to aid in the recovery of both terrestrial and aquatic habitats. In order for a restoration plan to be successful all relevant factors must be considered.

The most common factor associated with declines of anadromous salmonids is habitat degradation (Nehlsen et al. 1991; Frissell 1993), however a number of other factors play a key role. Many factors, such as habitat loss and degradation, over exploitation in sport and commercial fisheries, global warming and variable ocean conditions, are responsible to a varying degree for the depressed status of salmonids (Nehlsen et al. 1991).

Restoration of upslope and fluvial processes that create and maintain habitats must be integral components of any recovery program (Thomas et al. 1993). This report is limited to the unhealthy ecosystems of upslope, roads, stream function, and riparian areas, and does not address fish harvest management, global warming, or variable ocean conditions.

Stable landscape units outside the riparian zone are also not addressed in this report, but their status may have minor implications for stream ecosystems. Salmon have evolved to adapt to a series of natural impacts, therefor timber harvesting plans should be encouraged, where possible, to mimic the natural disturbance regimes (CSSP pg. 201, 210). Examples of natural disturbance regimes could be: blow down (windstorms cause major natural disturbance to forest in Clayoquot Sound, (CSSP, pg. 20), wildfires, encouraging uneven aged stands to develop from even aged second growth, etc.

The Clayoquot Sound Scientific Panel (CSSP) recommendations (Sustainable ecosystem management in Clayoquot Sound, 1995) (and Williams et al 1989) call for salmon recovery efforts to be based on restoring and conserving ecosystems, rather than simply restoring the instream habitat attributes (i.e. ecosystems should be considered in the development of recovery plans). This is important, as relationships between habitat condition and individual salmonid response have been well established within the habitat unit (Bisson et al. 1982;Nickelson et al. 1992), stream reach (Murphy et al. 1989) and to the watershed unit as well (Schlosser, 1991).

This Restoration Plan addresses not only the root causes directly responsible for the immediate loss of habitat quantity and quality, but also the ecosystem processes that create and maintain habitats through time, as per recommendation R7.1, R7.2 and R7.3 (CSSP pg. 153).

ACKNOWLEDGEMENTS

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- Steelhead Society, Habitat Restoration Corp.
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- Tla-o-qui-aht First Nations
- Tofino Salmon Enhancement Society
- Toquaht First Nations
- Ucluelet First Nations
- Vancouver Foundation
- Weyerhaeuser
- Wickaninnish Inn, Point Restaurant

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1.0 INTRODUCTION

The highest priority watersheds for restoration are called Target Watersheds. These watersheds are chosen jointly by Ministry of Water, Land and Air Protection (MWLAP), Department of Fisheries and Oceans (DFO), and the Ministry of Forests (MOF) through a process called a Regional Management Plan (RMP). Target Watersheds are those with high values of either fish or water resources, has significant pre-code related forestry impacts, and are estimated to have the highest chance for restoration works to be successful. Under this process, Kennedy Flats was listed as a Target Watershed.

A further process is also implemented jointly by government in 2001 to rank the priority for restoration of the Target Watersheds. Those with higher priority for restoration were called Priority Key watersheds. Kennedy Flats was also listed under this category.

As separate comparative analysis called a "Risk Assessment" was also completed by the authors prior to the Kennedy Flats Restoration Plan report to objectively document the condition and restoration success potential of the several watersheds within Clayoquot Sound. Kennedy Flats was confirmed to have the greatest chance of restoration success per invested funding. Once Kennedy Flats was selected for restoration, the Watershed Restoration Plan (WP or RP) was developed for agency and public review. The WP outlines priority restoration activities required to effectively, and efficiently enhance the natural restoration processes of the watershed area.

This restoration plan addresses proposed investments under FIA for pre-Forest Practices Code environmental impacts where the area licensee's have no legal obligation. As well, this report covers areas within the boundaries of the Pacific Rim Nation Park Reserve, and BC Parks.

1.1 Associated Terms

Abbreviations:

Deac: Deactivated/Deactivation
IFP: International Forest Products
IIS: IISAAK (forest enterprises)
LWD: Large Woody Debris
ML: Mainline (road)
NAR: No Action Required
Old Growth: Areas of stream not directly impacted by logging
Part: Partial
PC: Parks Canada
Perm: Permanently
RT: Riparian (restoration) Treatment
RVT: Riparian Vegetation Type
Sg: Spawning Gravel (placement)
SWD: Small Woody Debris
Wey: Weyerhaeuser

Aquifers: ground water tables.

Avulsion: the abrupt natural diversion of stream flow from an established channel into a new channel. The abandoned channel may be left dry with flow passing through it only during high flow periods. The new channel may be a re-occupied channel or may be a newly eroded channel. Avulsion may occur as a result of log jams or landslide debris re-directing flow away from the established channel.

Bedloading**:** an accumulation of sediment that can include silt, sand, clay, gravel and cobble. Excessive bedloading can affect both spawning and rearing habitat.

Coarse Woody Debris (CWD): large woody debris found on the forest floor.

Components: groupings of watershed processes - hillslope, riparian, and channel attributes.

Current Status: reference to the current condition of roads and streams

Enhanced Environmental Values (EEV): a section of the Resource Management Plan that is focused on Watershed Restoration.

Fry: juvenile fish living in a fresh water environment.

Glide: a section of stream with little residual depth and relatively higher flow with the substrate not penetrating the surface.

Instream Structures: combinations of Large Woody Debris (LWD) or boulders that are constructed to perform one or more functional characteristics, such as creating pools, riffles, glides, or providing cover or creating scour.

Key Watersheds: are defined as a watershed unit containing high values of either fish or water resources. To identify the key watersheds, all the watershed units were reviewed by the Ministry of Environment, Lands and Parks and the Department of Fisheries and Oceans to quantify the fish and water resources within each drainage. Each agency developed its own rating scale to reflect their individual mandates. those watersheds that contain high to very high values of targeted fish species/stocks or are important domestic water supply sources.

LWD Recruitment: the process where some stream side trees naturally die and eventually fall into the stream to function in creating pools, riffles, and glides.

Permanent Deactivation: Deactivation to the stage where the road will no longer need any maintenance. On steep unstable slopes, permanent deactivation involves the complete deconstruction and re-contouring of the original road.

Pool: a section of stream with residual depth and relative lack of flow.

Priority Key Watersheds: a key watershed that contains significant pre-code, forestry related impacts and has a high probability that the fish or water resources can be successfully restored.

Reaches: segments of stream that have similar characteristics and can apply to both main stem and smaller tributaries.

Resource Management Plan (RMP): The purpose of the Enhancing Environmental Values resource management plan is to ensure that “future investment by Forest Investment Account will be targeted at restoring and protecting fish habitat and domestic water supplies in priority watersheds which have been damaged or are threatened by pre-code forest development”

Riffle: a section of stream with little residual depth and relatively higher flow with the substrate penetrating the surface.

Riparian: a term used to describe the zone immediately adjacent to each side of the stream. The riparian zone for a given fish bearing stream can range from five to fifty metres.

Road Deactivation: a process typically carried out with an excavator that involves restoring the natural hillslope drainage paths and soil stabilization to prevent landslides and sedimentation. Permanent deactivation can be carried out to stabilize the road for the long term, and on steep slopes the road is "deconstructed" to restore the hillslope profile. Semi-permanent deactivation is carried out where future access is needed, with water management and limited roadfill pullback to reduce the road maintenance requirements.

Scour: the process where water is forced to a higher velocity on the bottom of the streambed to the extent that the water cleans all or most of the fine soil and organic matter, leaving large rock or gravel.

Shake Spall: unusable remnants of a log left behind after it has been processed for shakes and shingles.

Side Channels: constructed channels designed to provide a superior environment for spawning and rearing fish. The channels are usually constructed to have an axis roughly parallel to the main stem and are usually constructed because the main system has been severely impacted by bedloading. Side channels generally include an inlet and outlet unless a suitable ground water source can be found.

Smolts: seaward migrating juvenile salmonid. The term is normally applied to the migrants of species such as coho, sockeye, chinook, and steelhead that rear in freshwater for a period before migrating to the sea.

Soil Bioengineering: the use of living plant materials to perform some engineering function whether it be erosion control through the seeding of a grass and legume cover or installation of live pole drains to control sub-surface moisture. (Polster, 1999).

Sub Basins: sub-units of a watershed that are rainfall catchment or drainage basins, bounded peripherally by a topographic height of land.

Target Watersheds: those priority key watersheds, which have been selected as targets for restoration works. A priority key watershed was selected to be a target watershed if it has works underway or complete in at least two of the three components (i.e. up-slope, riparian or in-stream).

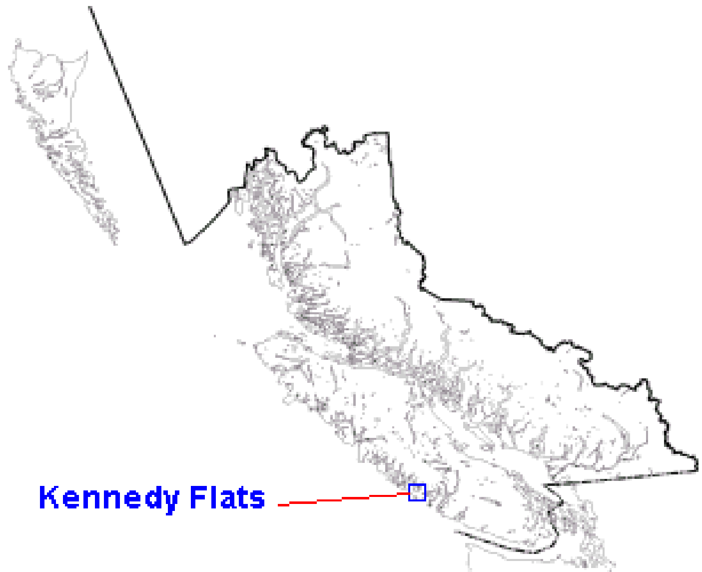
Semi-Permanent Deactivation: Deactivation that still allows some form of access.

Watershed Units: Major watershed boundaries agreed to jointly by MOF and MWLAP and identified on a base map for each Forest Renewal region (usually 3^{rd} to 5^{th} order streams averaging 30,000 ha, but ranging from 10,000 to 50,000 ha on the coast, to 500,000 ha in the interior.

2.0 STUDY AREA

Kennedy Flats (Resource Management Plan Watershed #249) is located on the west coast of Vancouver Island in South Clayoquot Sound, and is located within the Vancouver Forest Region, South Island Forest District, and is approximately 10 km north of Ucluelet. The study area covers approximately 12,937 ha and is covered by map units: 92F012, 92F002, 92F003, 92C092, and 92C093.

Figure 1, Location Map



Kennedy Flats is bordered on the West by the Pacific Ocean, and on the East by Kennedy Lake and lower Kennedy River. The North border of Kennedy Flats is Grice Bay and Tofino Inlet, and South border is the Lostshoe - Thunderous Creek divide, and the Lostshoe Creek Clayoquot/Barkley Sound divide.

The streams of Kennedy Flats contain Coho, Chum, Chinook, Pink, and Sockeye Salmon, Steelhead, Resident and sea-run Cutthroat Trout, Rainbow Trout, Lamprey, Stickleback, and Sculpin (FISS Fish Distribution for Waterbody(ies)).

Broad flood-plains and meandering stream channels characterize Kennedy Flats. Rolling to moderately steep hills and bedrock knobs, which trend roughly northwest across the area, interrupts the generally flat topography. Total relief is approximately 250m in the Kootowis Creek and Staghorn Creek areas.

The Lostshoe Creek Watershed is the only watershed in the Kennedy Flats area that has any significant up-slope portion, rising sharply to more than 700m. It straddles the Estevan Coastal Plain and the Vancouver Island Ranges portions of the Vancouver Island Mountains section of the Insular mountains physiographic region (Holland 1964). The bedrock geology is composed of pre-Cretaceous sedimentary and volcanic rock. Periods of glacial activity are seen in compact basil tills while periods of active alluvial deposition are evidenced by the sand and gravel deposits which act as aquifers. This complex history has resulted in the upper Lostshoe Creek area being inherently unstable (Polster 1998). Lostshoe Creek drains in a southwesterly direction, exiting through Pacific Rim National Park into the Pacific Ocean at Florencia Bay.

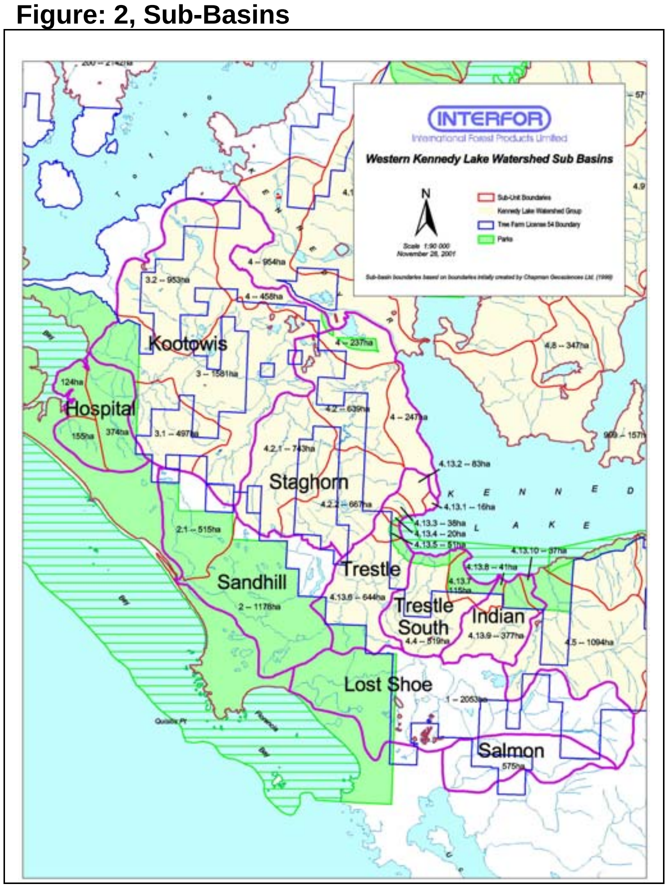
The entire Kennedy Flats watershed unit is 12,937 ha (129.4 square kilometres) which includes nine sub-basins: Kootowis, Hospital, Sandhill, Staghorn, Trestle South, Trestle, Indian/Harold, Lostshoe, and Salmon.

Table 1

Stream	Watershed Catchment Area (ha)	Gross Watershed Area (ha)	Mainstem & Major Tributary Length (km)	Mainstem Gradient (%)	Stream Order
Hospital	155 / 374	653	10.36	0.3	3rd
Kootowis	3031	3489	77.59	0.4	4th
Staghorn	2049	2533	47.92	0.3	4th
Trestle	644	852	14.70	0.3	2nd
Trestle South	519	634	13.10	0.3	2nd
Indian/Harold	377	455	12.95	1.5	3rd
Lostshoe	2053	2053	32.90	0.4	3rd
Salmon	575	575	6.90	0.5	3rd
Sandhill	1693	1693	24.90	0.4	3rd
TOTAL	11,470	12,937	241.32		

Sandhill Creek lies primarily within Pacific Rim National Park, and generally flows in a northwesterly direction exiting into the Pacific Ocean.

Figure: 2, Sub-Basins



Scale not as designated, see Appendix 7 for larger sub-basin map

Hospital (which includes two creeks: Pickett and Wingen Mill) and Kootowis Creek flow generally in a northwesterly direction exiting into Grice Bay. Staghorn Creek flows generally in a northeasterly direction exiting into Kennedy Lake near the outlet of lower Kennedy River. Trestle South Creek, Trestle Creek, and Indian Creek (also known as Harold Creek) flow generally in a northerly direction, exiting into Kennedy Lake. Salmon Creek (also known as Smith Creek) flows in a southeasterly direction and exits into Ucluelet Inlet.

The nearest climatic station is at the Tofino Airport, which is about 6 km to the north of the Kootowis Creek sub-basin. Both Tofino Airport and Kennedy Flats are subject to the prevailing Pacific weather systems. Based on records over the period 1942 to 1990, the average annual precipitation at this station is 3295mm (or 10.8 ft). The wettest quarter is November through January when the monthly precipitation ranges from 425 to 458mm. June to August is typically the driest quarter, with precipitation ranging between 83 and 122mm. The average annual temperature is 9.0°C, with daily means between 5.3 and 12.7°C. Sub-zero temperatures are rare.

Most of the logging in the Kennedy Flats area occurred during the 1950's and 1960's (including within what is now Pacific Rim National Park), with some additional logging in the 1970's and 1980's. Logging began as early as the 1920's. Logging in the 1950's and 1960's generally involved cross-stream yarding and a complex network of non fish-friendly roads, despite the fact that the streams were known as salmon bearing. It was considered the most cost effective method of harvest and approved by DFO (Willington et al 1978). In the DFO Stream Escapement Catalogue (Brown et al 1979) a reference to Kootowis Creek in 1966 notes "Coho fry in the upper swamps and feeders are very abundant. An excellent rearing area". Yet by 1972 the notations were not so favorable: "logging on small feeder streams is having an adverse affect on coho". In a Watershed Data Base report, (Brown et al 1987) it is noted that by 1980, 42% of the watershed had been logged.

The old harvesting practices left significant amounts of residual wood behind, leaving vast opportunities for salvage loggers. Decaying logging roads with collapsed culverts and bridges, coupled with cross spanning logging debris and residual shake spall from the salvage loggers has resulted in severely degraded fish habitat. Vast areas of the Kennedy Flats streams are literally plugged with woody debris affecting fish passage (creating barriers in many cases), water quality, and hydrology.

The high concentration of woody debris areas act as semi permeable dams, flooding large tracts of forest land. The water quality is especially poor during the summer months as the flood plain creates increased surface area for solar radiation, resulting in increased water temperature to near critical levels and lowers dissolved oxygen content. The flood plains create a poor growing site for conifer tree species, resulting in poor cover and further exacerbating the water quality problem. Slower water flow has failed to keep spawning beds clean of settled organics, making quality spawning sites the most limiting factor for fish production. Ironically, the clustered woody debris segments of the Kennedy Flats streams have resulted in the interception of natural Large Woody Debris (LWD) recruitment, causing many segments of creeks between the debris clusters to be LWD deficient, resulting in lengthy sections of stream without needed complexing.

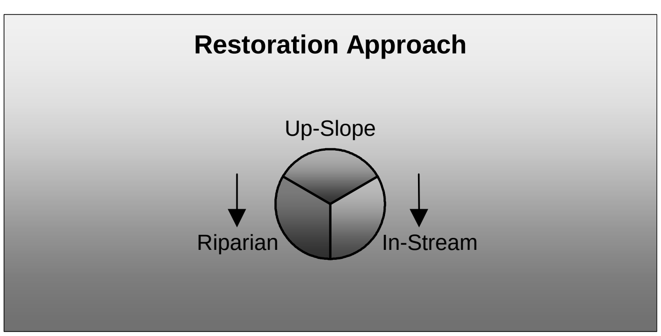
All sub-basins are eligible for restoration funding under Forest Investment Account (FIA) with the exception of portions of Lostshoe, Sandhill, and Indian that lie within Pacific Rim National Park, and some small segments within private land. The areas not eligible for FIA funding will still be included in this report and it is acknowledged that alternate sources of funding will be required to complete the restoration activities.

Kennedy Flats includes the traditional territory of the Tla-o-qui-aht, and Ucluelet First Nations. Tenure includes Parks Canada (PC), BC Parks (BCP), Tree Farm License 54 held by Interfor (INT), Tree Farm License 44 held by IISAAK (IIS), the Regional District landfill site, and some small patches of private land owned primarily by Interfor and Weyerhaeuser.

3.0 RESTORATION APPROACH

Many of the pre Forest Practices Code (FPC) logging practices have resulted in significant impacts on salmon and trout species habitat. Due to sub-standard road building methods, particularly in the steep coastal settings and sensitive flood plains, there was often an increase in sediment, and woody debris delivery into stream systems. Collapsing log culverts, miss-placed culverts, and poorly located roads on the floodplain areas have resulted in water interception, partial or full fish barriers, and diverted stream segments. Sources of sediment include road surfaces, poor water management, and land slides. Sources of wood debris include historic cross-stream yarding waste and shake spall.

For restoration of impacted coastal streams we generally utilize a top-down approach, because without addressing sediment sources, in-stream restoration can be very ineffective. The ultimate goal for the up-slope restoration programs is to address unstable logging roads (through deactivation) before any slides occur or have (or are estimated to potentially have) adverse impacts on aquatic resources. Priority of up-slope deactivation is dependent on where it would be most beneficial in preventing or reducing excessive sediment influx.



Deactivation of the highest risk roads are completed first, working consecutively towards, but not necessarily including, the lower risk roads. The approach is to fully restore the hill slope at the old road location then aggressively seed the exposed soil.

The goal for the flood plain roads is to re-establish natural steam flow patterns, coordinating deactivation with access requirements for in-stream and riparian restoration.   Where deactivation of roads occur at fish bearing crossings, a biological prescription that enhances fish habitat is implemented along with the deactivation prescriptions. Fish habitat enhancement occurs to 10 metres off each side of the road centerline.

In up-slope areas where there has been slide activity, open slope failures are hydro-seeded with a mixture of grass seed (native seed when available), slow release fertilizer, and mulch. Grass seeding is effective in reducing fine sediment leeching from the slide.

Grass establishes well on areas of a slide that are relatively stable. Zones of instability are identified the following year by observation of areas of poor grass establishment. Following the deactivation of the roads there is a focus on restoring the unstable portions of the landslides. To stabilize and revegetate the slides an approach called bio-engineering is utilized. Basically this is the use of live willow cuttings to hand build living, self-maintaining, retaining walls.

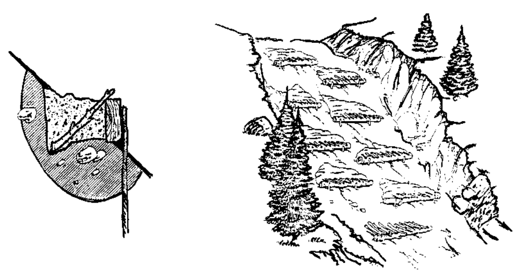
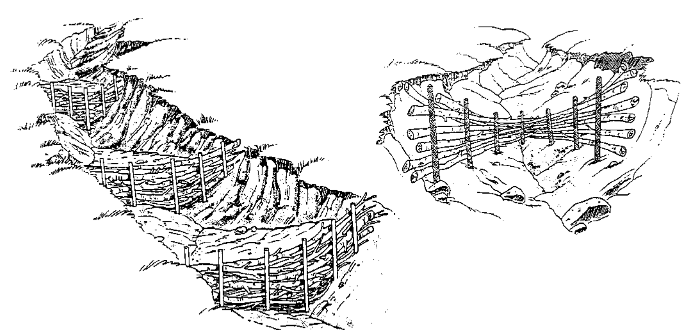


Figure 4, Modified Brush Layer (MBL). Dormant willow cuttings are used to build living, self maintaining, retaining walls on land slides. Willow is used because the cuttings grow roots where exposed to soil, and shoots where exposed to air

Figure 5, Live Gully Breaks (LGB). These bio-engineering structures are used to reduce the energy of incised areas of a land slide



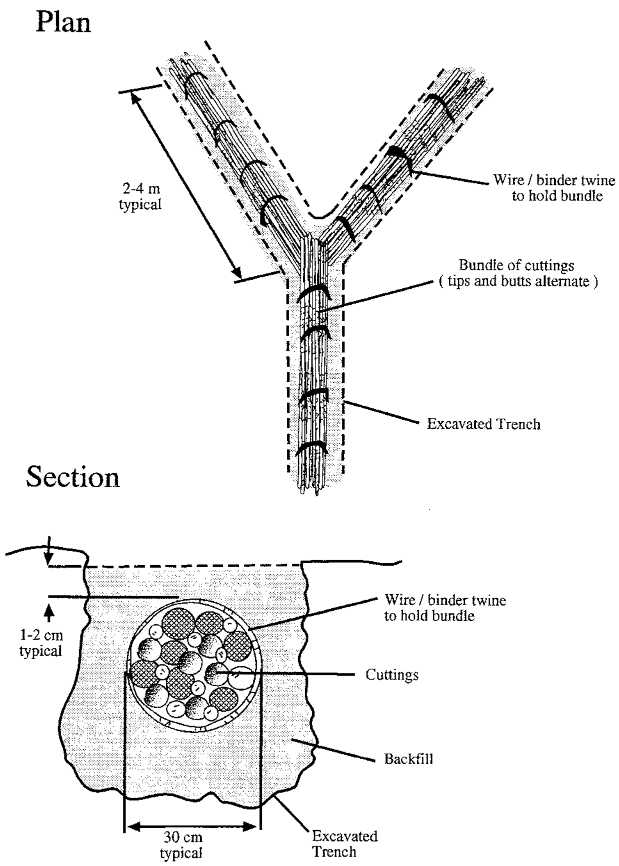


Figure 6, Live Pole Drain (LPD) These bio-engineering structures are used to create a living, self-maintaining pipe in incised areas with relatively consistent water flow or seepage

Only when the high risk up-slope areas have been addressed should the in-stream restoration work proceed. In-stream work is generally divided into two components: riparian (the vegetative buffer strip along a stream) and actual in-stream work.

In the past, cut blocks were logged right to the stream banks, which virtually eliminated any chance of larger trees dying and falling into the stream. In many cases alder and brush have taken over the riparian areas of the streams and rivers. While Alder can supply good cover, when it dies and falls in the stream it breaks down quickly (conifers are far more resilient). On all of our stream rehabilitation projects there is a strong focus on developing a new, uneven aged coniferous riparian zone.

A common result, in high relief (steep) areas, of some pre-code logging practices is that debris torrents have swept away many of the natural LWD structures rendering the stream system relatively featureless (low pool, riffle, and glide frequency). The bedloading fills in the pools and thalweg (the deepest section of a stream) causing in the energy of the stream to be re-distributed towards the stream banks.

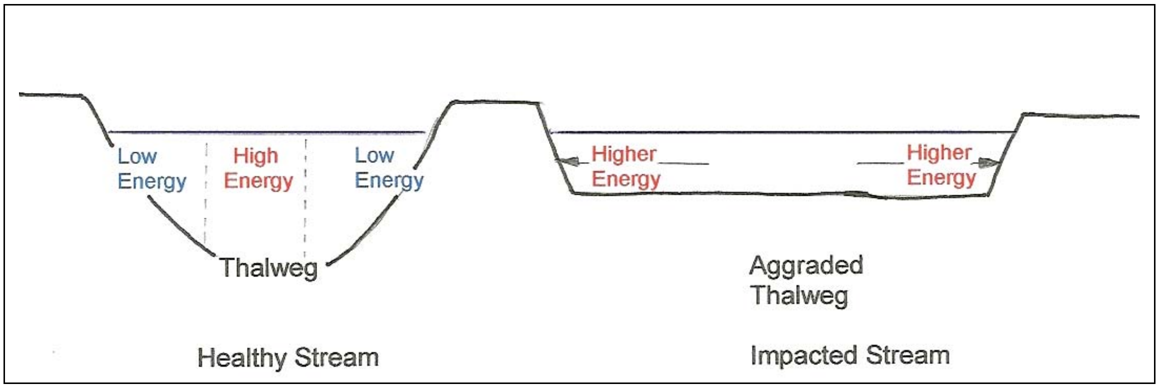


Figure 7

As this energy erodes the banks (made even less stable with the lack of large conifer roots), the bedload problem is compounded. While an aggraded thalweg is apparent in the upper, and the lower two-km of Lostshoe Creek watershed, it is not apparent in the remaining low energy sections of the Kennedy Flats streams.

Generally, in-stream restoration work involves the creation of pools, riffles and glides by installing structures in-stream made of LWD and/or rock. By securing LWD in place (with cables or boulders) biologists and engineers can temporarily (for 50 years) mimic nature in its creation of pools, riffles and glides. LWD is also very important for cover, for protection from predators.

In the high density wood debris jams on Kennedy Flats, there is still a focus on creating a natural pool-riffle-glide frequency, but it is completed by removing excess Small Woody Debris (SWD), and re-locating or re-orienting LWD (see Appendix 1, for "KWRP Wood Debris Placement SOP").

One of the limiting factors for fish production in the Kennedy Flats streams is the lack of quality spawning gravel. Once the streams have been restored through removal of road barriers, SWD, and addition of LWD complexing, the stream requires time to flush out fine organics that have been allowed to settle and accumulate over the years. After two or three years, when the majority of the fine organics have been flushed through, replacement spawning gravel can be added (see Appendix 2 for current "Spawning Gravel Placement SOP").

3.1 Road Deactivation Planning

International Forest Products has developed a new forest road risk assessment procedure that is expected to increase the benefits of the road deactivation program. The method is used to objectively rank and compare potential landslide risk on individual logging roads.

Initially, all Forest Renewal BC road deactivation projects were proposal driven, with each proposal being applicable to one watershed. The mandate was to complete the deactivation of all roads within a watershed before moving onto the next. In many cases, access to enhanced forestry opportunities, and recreation activities were cut off by the unnecessary deactivation of moderate and low risk roads. Although watershed overview assessments were completed, choices of which watershed to be addressed next were often subjective.

In1998, a risk model was developed by the Ministry of Forests (MOF) to help prioritize which watershed should be addressed next, but the criteria used could not accurately assess landslide hazard and risk on an individual road.

In early partnerships, Interfor and MOF recognized the need for a better planning system. Based on the 1998 risk model, Mike Wise, P.Eng. (GeoWise Engineering Ltd.), Mike Leslie (Mike Leslie Consulting Ltd.) and Interfor developed a new planning methodology and designed and field tested field cards to document a road's condition. This new methodology provides an objective risk assessment of each individual road, allowing for a comparison of roads throughout Interfor's operating area.

In order to document road conditions, Interfor's field card was broken into sections to give a numerical rating to indicate the relative risk for each road where: *Environmental Risk = Hazard x Consequence*.

Hazard is a ranking of instability based out of a maximum score of 9. The higher the instability of the road (i.e. the likelihood of a road-related landslide initiating within the next five years) the higher ranking it receives. The card is designed to record hazard indicators of road instability and their location such as tension cracks, displacement, incising, water control problems, etc.

When looking at the stability of an existing road, how the roads in the watershed are performing is usually a good indication of comparable stability. If there are no landslides elsewhere in the watershed, that watershed may be inherently stable. How the road was constructed is also important as roads have different kinds of stability concerns based on what kind of equipment was used to build them. A road built by a bulldozer will have different stability concerns than a road built by an excavator.

As well, the geometry and construction material of the road is important. You need to know how much road-fill you're looking at and what angle (or slope) the road is at. The type of soil that was used to construct the road is important. Is the material a very coarse rocky material that drains well with a fairly high internal strength or is it a fine-grained soil, which is less well drained and doesn't have that same high internal strength?

Consequence is also based on of a maximum score of 9, and is a ranking of what a slide would impact if it were to initiate. The greater the potential damage, the higher the consequence ranking the road receives. A section of the field card was designed to record a list of consequences such as impact on a salmon bearing stream, loss of human life, property damage, visual aesthetics, etc.

Once the roads have been rated for *Environmental Risk*, then there is assessment of the feasibility of a proposed deactivation program. This *Feasibility* Rating also has a maximum score of 9, and includes factors such as access, technical feasibility and level of funding. For example, if you've got to put in a $200,000 bridge to access a road to deactivate it, then you'll utilize a whole lot of your budget just putting in that bridge. Whereas, if you've got a road with an equal environmental risk but the access is good, then that's the one you should do first.

The *Environmental Risk* score is then multiplied by the *Feasibility* Score to give a maximum score of 729, indicating *Overall Risk*.

The scores of all Interfor roads are summarized so they can be objectively compared. Decisions can then be made that ensure that a given level of funding will provide the greatest reduction of risk, thus allowing for a "best investment" planning process. Detailed road deactivation prescriptions are then developed only for those roads identified by the risk assessment that are to be addressed in the next year's deactivation program.

Road deactivation planning must be carefully coordinated with the stream and riparian restoration in order not to eliminate important access to work sites. Planned road deactivation and current road status are mapped by the licensee, and advertised for public viewing through a "development plan" process annually.

Table 2, Road Risk Template

Up-slope WRP Risk Assessment Rating
Overall Risk = Hazard x Consequence x Project Feasibility
Maximum risk Rating would be 9 x 9 x 9 = 729

Hazard: (the likelihood a slide will initiate) rating scale:

Value	Description
7-9 (high)	There is a significant probability that the hazard will worsen within the next 5 years
4-6 (mod)	Addressing the hazard will be required, but it is not expected to worsen significantly over the next 5 years
1-3 (low)	Low likelihood of a slide initiating now or over the next 5 years

Consequence: (what a slide would impact if it were to initiate) rating scale:

Value	Description
7-9 (high)	Major fish streams, human health, infrastructures
4-6 (mod)	Minor fish streams (resident fish only), productive forest land, significant wildlife habitat, high visual quality
1-3 (low)	Lower visual quality, informal recreational values

Feasibility:

Access (is access by road possible) rating scale:

Value	Description
3 (high)	Road intact / machine access possible
2 (mod)	Road intact but overgrown / Reactivation required to install drainage structures (road presently cross-ditched/Road previously deactivated to inadequate standard)
1 (low)	No access possible (road removed by slide)/reactivation not required to reduce hazard

Technical (will work completed using proven road deactivation techniques reduce risk) rating scale as follows:

Value	Description
3 (high)	A reasonable level of intervention is likely to reduce the over-all hazard rating to low
2 (mod)	A reasonable level of intervention is likely to reduce the over-all hazard rating to an acceptable level
1 (low)	A reasonable level of intervention is **not** likely to reduce the over-all hazard rating to an acceptable level/No hazard exists

Fiscal (can road be deactivated given the current funding level) rating scale as follows:

Value	Description
3 (high)	Hazard will be reduced to low given the allotted budget
2 (mod)	Hazard will be significantly reduced with allotted budget
1 (low)	Hazard will **not** be significantly reduced with allotted budget

ENVIRONMENTAL RISK

CRITICAL	**64 or greater**
HIGH	**55 to 63**
MEDIUM	**28 to 54**
LOW	**1 to 27**

OVERALL RISK BREAKDOWN

CRITICAL	**567or greater**
HIGH	**486 to 566**
MEDIUM	**243 to 485**
LOW	**Less than 243**

Roads listed in the "tenure" columns, indicate access routes only. It does not indicate licensee responsibility, or road permit status.

Table 3, Hospital Current Road Status (*Refers to deactivation to be completed)

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac* Length	Cost (to deac)	Tenure
Hospital	KCR 18	2240	Perm.Deac.00	**L**	0	$ 0.00	PC
	KCR18B	240	Overgrown/Stable	**L**	0	$ 0.00	PC
	KCR18F	1060	Proposed Perm	**H**	1060	$ 4,552	PC
	KCR18F1	158	Overgrown/Stable	**L**	0	$ 0.00	PC
	KCR18F2	100	Overgrown/Stable	**L**	0	$ 0.00	PC
	KCR18G	100	Overgrown/Stable	**L**	0	$ 0.00	PC
	KCR18H	786	Proposed Perm	**H**	786	$ 2,000	PC
	KCR18H1	130	Overgrown/Stable	**L**	0	$ 0.00	PC
TOTALS:		**4,814 m**			**1,846 m**	**$ 6,552**	

Table 4, Kootowis Current Road Status

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length	Cost	Tenure
Kootowis	KR77	2611	Perm.Deac.97	**L**	0	$ 0.00	IFP
	KR77A	172	Perm.Deac.97	**L**	0	$ 0.00	IIS
	KR77B	147	Perm.Deac.97	**L**	0	$ 0.00	IIS
	KR77C/C1	342	Perm.Deac.97	**L**	0	$ 0.00	IFP
	KR77D	156	Perm.Deac.97	**L**	0	$ 0.00	IFP
	KR77D2	406	Perm.Deac.97	**L**	0	$ 0.00	IFP
	GBR99	580	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR97	180	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR98	1445	Perm.Deac.97	**L**	0	$ 0.00	IIS
	GBR98-1	440	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR98-2	155	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR98-3	710	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR98-4	30	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR88	1260	Partial.Deac.96	**C**	476	$ 6,800	IIS
	GBR88A	1033	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR88A1	318	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR88B	925	Existing Perm	**L**	0	$ 0.00	IIS
	GBR88C	255	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR88D	58	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR87	1082	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR87A/A1	300	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR87B	161	Perm.Deac.96	**L**	0	$ 0.00	IIS
	BR.153	1900	Partial.Deac.98	**C**	1487	$ 4,000	IFP
	1BR.6	787	Perm.Deac.97	**L**	0	$ 0.00	IIS
	BR.153A	1890	Perm.Deac.97	**L**	0	$ 0.00	IFP
	BR.153A1	948	Perm.Deac.97	**L**	0	$ 0.00	IFP
	BR.153-10	60	Overgrown/Stable	**L**	0	$ 0.00	IIS
	BR.153-14	212	Overgrown/Stable	**L**	0	$ 0.00	IFP
	BR.153-17	125	Overgrown/Stable	**L**	0	$ 0.00	IFP
	GBR30	587	Proposed Perm	**M**	587	$ 413	IFP
	GBR31	124	Proposed Perm	**L**	124	$ 200	IFP
	GBR65	408	Perm.Deac.97	**L**	0	$ 0.00	IIS
	GBR66	206	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR68	686	Proposed Perm	**H**	686	$ 2,340	IIS
	GBR68A	25	Partial.Deac.97	**L**	25	$ 340	IIS
	GBR68A1/A1A	206	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR68A2	389	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR68A3	123	Perm.Deac.97	**L**	0	$ 0.00	IIS
	GB69	700	Perm.Deac.97	**L**	0	$ 0.00	IIS
Kootowis	GBR69A	300	Overgrown/Stable	**L**	0	$ 0.00	IIS

road status con't	GBR69A1	100	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR58	2022	Partial.Deac.97	**H**	1437	$13,224	IIS
	GBR58B/B1	431	Perm.Deac.97	**L**	0	$ 0.00	IFP
	GBR58C/D/G	249	Overgrown/Stable	**L**	0	$ 0.00	IFP
	GBR58E/E1/E2	616	Proposed Perm	**H**	616	$ 1,850	IIS
	GBR58F	196	Proposed Perm	**H**	196	$ 8,433	IFP
	GBR58H	72	Perm.Deac.97	**L**	0	$ 0.00	IFP
	GBR44	618	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR45	1358	Proposed Perm	**C**	1358	$ 8,216	IIS
GBR45 Deactivation cost will increase significantly, as a bridge is required for access.							
	GBR45A	425	Proposed Perm	**H**	425	$ 1,483	IIS
	GBR45B	246	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR.WEST	2795	Proposed Perm	**C**	2795	$60,117	IIS
	GBR42	187	Perm.Deac.96	**L**	0	$ 0.00	IFP
	GBR43	214	Perm.Deac.96	**L**	0	$ 0.00	IFP
	GBR48	1292	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR48A	249	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR48B/B1	271	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR54	1302	Partial.Deac.96	**L**	4	$ 335	IIS
	GBR54A/B	155	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR56	1350	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR56A	886	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR56B	102	Overgrown/Stable	**L**	0	$ 0.00	IIS
	GBR60	873	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR60A	100	Perm.Deac.96	**L**	0	$ 0.00	IIS
	GBR-A	173	Perm.Deac.96	**L**	0	$ 0.00	IIS
	KCR15	2215	Proposed Perm	**H**	1571	$ 5,592	IIS
	KCR15A	485	Proposed Perm	**C**	485	$ 2,340	IIS
	KCR15B	227	Proposed Perm	**M**	227	$ 560	IIS
	KCR18	1304	Proposed Perm	**H**	1304	$ 3,875	IIS
	KCR18A	264	Proposed Perm	**H**	264	$ 2,686	IIS
	KCR18B	560	Proposed Perm	**H**	560	$ 2,340	IIS
	KCR18C	80	Overgrown/Stable	**L**	0	$ 0.00	PC
	KCR18D	90	Overgrown/Stable	**L**	0	$ 0.00	IIS
	KCR18E	80	Overgrown/Stable	**L**	0	$ 0.00	PC
	BR.156	331	Overgrown/Stable	**L**	0	$ 0.00	IIS
	L104B	1020	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L104B1/B2	263	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L104C	1195	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L104C1/C3	198	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L104C2	248	Perm.Deac.97	**L**	0	$ 0.00	IFP
	BR.155	200	Overgrown/Stable	**L**	0	$ 0.00	IFP
	KCR-A	179	Overgrown/Stable	**L**	0	$ 0.00	IIS
	KCR-B	224	Proposed Perm	**H**	224	$ 1170	IIS
	Gun Road	840	Upgrade	**H**	10	$ 30	IFP
	GR1	180	Perm.Deac.97	**L**	0	$ 0.00	IFP
	GR2	100	Perm.Deac.97	**L**	0	$ 0.00	IIS
	KCR-C	435	Proposed Perm	**M**	435	$ 93	IIS
	KCR-C1	112	Overgrown/Stable	**L**	0	$ 0.00	IIS
	BR.110A	296	Overgrown/Stable	**L**	0	$ 0.00	IFP
	BR110A1	237	Perm.Deac.97	**L**	0	$ 0.00	IIS
	BR.160	192	Overgrown/Stable	**L**	0	$ 0.00	IFP
	BR.161	370	Perm.Deac.97	**L**	0	$ 0.00	IFP
	BR.162	250	Perm.Deac.97	**L**	0	$ 0.00	IFP
	BR.180	1030	Proposed Perm	**C**	1030	$ 3,117	IFP
	BR.181	135	Perm.Deac.97	**L**	0	$ 0.00	IFP

Kootowis road status	BR.182	301	Part.Deac.97	**L**	69	$ 146	IFP
	BR.182A	65	Perm.Deac.97	**L**	0	$ 0.00	IFP

con't	BR.183	94	Overgrown/Stable	**L**	0	$ 0.00	IFP
	BR.130	1520	Partial.Deac.96	**H**	804	$ 2,558	IFP
	BR.130A	90	Overgrown/Stable	**L**	0	$ 0.00	IFP
	BR.130B	343	Perm.Deac.96	**L**	0	$ 0.00	IFP
	BR.130C	116	Perm.Deac.96	**L**	0	$ 0.00	IFP
	BR.132	120	Overgrown/Stable	**L**	0	$ 0.00	IFP
	BR,140	113	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L-150	761	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L-150B/D	187	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L-150A/C/E	412	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L120	2309	Partial.Deac.97	**H**	1923	$16,235	IFP
	L120A/B	180	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L121	596	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L121A	81	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L122	398	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L122A	91	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L122B	240	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L123	1239	Proposed Perm	**L**	1239	$ 3,567	IFP
	L123A/C	92	Overgrown/Stable	**L**	0	$ 0.00	IIS
	L123B	35	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L123D	293	Proposed Perm	**L**	293	$ 372	IIS
	L123D1	100	Proposed Perm	**L**	100	$ 102	IIS
	L124	130	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L125	131	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L126	265	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L127	92	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L114	303	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L114A	61	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L115	612	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L115A	75	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L117	108	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L102	597	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L103	410	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L104	1423	Partial.Deac.97	**H**	805	$ 3,350	IFP
	L104A	80	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L106	180	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L107	623	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L108	949	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L108A	59	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L108B	123	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L109	473	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L109A	470	Perm.Deac.96	**L**	0	$ 0.00	IIS
	L109B	73	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105A	443	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L105A1	40	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105B	111	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105E	101	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105F	106	Overgrown/Stable	**L**	0	$ 0.00	IFP
	BR.100 LWR	3680	Proposed Perm	**C**	3680	$ 8,383	IFP
	BR.100 UPR	4075	Proposed Perm	**C**	4075	$14,979	IFP
	KCR STH	4750	Permitted ML	**H**	N/A	N/A	IIS
	KCR NTH	3800	Permitted ML	**H**	N/A	N/A	IIS
	KRR	6100	Permitted ML	**H**	N/A	N/A	IIS
	AWP STH	760	Permitted ML	**M**	N/A	N/A	IFP
TOTALS:		**93,043 m**			**29,314**	**$179,266**	

Table 5, Staghorn Current Road Status

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Staghorn	L105	2461	Part.Deac.96/97	**H**	1572	$ 1,680	IFP
	L105C	669	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105C1	490	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105C1A	178	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105C2	466	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L105C2A	36	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105D	911	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L105D1	289	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105G	450	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105G1	131	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105H	483	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L105HA	119	Perm.Deac.96	**L**	0	$ 0.00	IFP
	L105HA1	32	Existing Perm	**L**	0	$ 0.00	IFP
	L105HB	103	Existing Perm	**L**	0	$ 0.00	IFP
	L105I	84	Existing Perm	**L**	0	$ 0.00	IFP
	BR.1390	748	Proposed Perm	**C**	748	$ 3,056	IFP
	BR.1390A	531	Perm.Deac.97	**L**	0	$ 0.00	IFP
	BR.1390B	84	Existing Perm	**L**	0	$ 0.00	IIS
	L-190	793	Proposed Perm	**M**	793	$ 3,057	IFP
	L-190A	143	Existing Perm	**L**	0	$ 0.00	IFP
	L-191	395	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L-191A	90	Existing Perm	**L**	0	$ 0.00	IFP
	L-192A	274	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L194	691	Proposed Perm	**M**	77	$ 1,181	IFP
	L-192B/C/ C1/F/H/I	840	Existing Perm	**L**	0	$ 0.00	IFP
	L192D	220	Existing Perm	**L**	0	$ 0.00	IFP
	L192G	158	Existing Perm	**L**	0	$ 0.00	IFP
	L192J	386	Proposed Perm	**M**	386	$ 695	IFP
	AWP.NORTH	2515	Proposed Perm	**C**	2515	$10,057	IFP
	AWP A	275	Existing Perm	**L**	0	$ 0.00	IIS
	AWP A1	130	Existing Perm	**L**	0	$ 0.00	IFP
	AWP B	100	Existing Perm	**L**	0	$ 0.00	IIS
	L192	1888	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L192L	610	Existing Perm	**L**	0	$ 0.00	IFP
	L192L1	94	Existing Perm	**L**	0	$ 0.00	IFP
	L192M	365	Existing Perm	**L**	0	$ 0.00	IFP
	L192N	121	Existing Perm	**L**	0	$ 0.00	IFP
	L193	1130	Partial.Deac.97	**L**	281	$ 219	IFP
	L193B	725	Perm.Deac.97	**L**	0	$ 0.00	IFP
	L193C	181	Existing Perm	**L**	0	$ 0.00	IFP
	L193D	224	Perm.Deac.97	**L**	0	$ 0.00	IIS
	GBR10	948	Proposed Perm	**H**	948	$ 3,372	IFP
	GBR11/12/13	429	Existing Perm	**L**	0	$ 0.00	IFP
	STAG ML	3365	Proposed Perm	**H**	3365	$19,431	IIS
Note: STAG ML costs will be higher due to the requirement for bridge access, Survey by Hydrological Engineer Recommended							
	STAG A/B	276	Existing Perm	**L**	0	$ 0.00	IIS
	STAG 10/20	487	Existing Perm	**L**	0	$ 0.00	IIS
	STAG 30	983	Proposed Perm	**M**	983	$ 6,782	IIS
	STAG 31	330	Proposed Perm	**H**	330	$ 3,050	IIS
	STAG 40	338	Proposed Perm	**L**	338	$ 1,092	IIS
	STAG 50	875	Proposed Perm	**L**	875	$ 2,015	IIS
Staghorn	STAG 60	210	Proposed Perm	**L**	210	$ 140	IIS

road status con't	STAG 61	235	Overgrown/Stable	**L**	0	$ 0.00	IIS
	T.MAIN.WEST	888	Proposed Perm	**H**	888	$ 2,340	IIS
	TRES.10	250	Overgrown/Stable	**L**	0	$ 0.00	IIS
	WEST MAIN	5640	Permitted ML	**C**	N/A	N/A	IIS
	W5	720	Proposed Perm	**H**	720	$ 2,349	IIS
	W10	905	Partial Deac.97	**H**	342	$ 2,552	IIS
	W11	435	Overgrown/Stable	**L**	0	$ 0.00	IIS
	W11A	450	Overgrown/Stable	**L**	0	$ 0.00	IIS
	W12	315	Overgrown/Stable	**L**	0	$ 0.00	IIS
	W20	998	Perm.Deac.97	**L**	0	$ 0.00	IIS
	W21	1350	Perm.Deac.97	**L**	0	$ 0.00	IIS
	W21A	285	Overgrown/Stable	**L**	0	$ 0.00	IIS
	W22	35	Overgrown/Stable	**L**	0	$ 0.00	IIS
	W40	843	Perm.Deac.97	**L**	0	$ 0.00	IFP
	W41	335	Overgrown/Stable	**L**	0	$ 0.00	IFP
	W41A	323	Overgrown/Stable	**L**	0	$ 0.00	IFP
	W50	434	Perm.Deac.97	**L**	0	$ 0.00	IIS
	W60	606	Overgrown/Stable	**L**	0	$ 0.00	IFP
	W61	414	Overgrown/Stable	**L**	0	$ 0.00	IFP
	W70	980	Exist.Semi-Perm	**L**	0	$ 0.00	IIS
	W80	1040	Proposed Perm	**H**	1040	$ 4,784	IIS
	W85	138	Overgrown/Stable	**L**	0	$ 0.00	IFP
	W90	746	Proposed Perm	**L**	746	$ 1,343	IFP
	KRR	1975	Permitted ML	**H**	N/A	N/A	IIS
	AWP STH	4278	Permitted ML	**H**	N/A	N/A	IFP
	GBR.EAST	3245	Permitted ML	**H**	N/A	N/A	IFP
	TR.ML EST	500	FDP Upgrade	**H**	N/A	N/A	IIS
TOTALS:		**57,217 m**			**17,157 m**	**$69,195**	

Table 6, Trestle Current Road Status

Sub-Basin	**Road**	**Length (m)**	**Current Status**	**Overall Risk**	**Deac Length (m)**	**Cost**	**Tenure**
Trestle	TRES.40	438	FDP Upgrade	**L**	N/A	N/A	IFP
	TRES.50	405	Proposed Perm	**L**	405	$ 256	IFP
	TRES.51	198	Perm.Deac.97	**L**	0	$ 0.00	IFP
	WESTMAIN	1956	Permitted ML	**C**	N/A	N/A	IIS
	W95	1623	Proposed Perm	**H**	1623	$ 8,133	IIS/BCP
	W95A	336	Overgrown/Stable	**L**	0	$ 0.00	BCP
	L15F	900	Proposed Perm	**H**	900	$ 2,456	IFP
	L15F2	501	Proposed Perm	**M**	501	$ 240	IIS
	L15F2A	195	Overgrown/Stable	**L**	0	$ 0.00	IIS
	L15F2B	391	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L15F3	127	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L15F4	100	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L15F5	318	Proposed Perm	**H**	318	$ 1,248	IFP
	L15F5A	100	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L15F6	100	Overgrown/Stable	**L**	0	$ 0.00	IFP
	TR.ML.EST	1763	FDP Upgrade	**H**	N/A	N/A	IIS
	SH1	1370	Proposed Perm	**H**	1370	$ 6,998	IFP
	SH1A	263	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH1B	200	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH1C	123	Overgrown/Stable	**L**	0	$ 0.00	IFP
	SH1D	56	Overgrown/Stable	**L**	0	$ 0.00	IFP
TOTALS:		**11,463 m**			**5,312 m**	**$19,331**	

Table 7, Trestle South Current Road Status

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Trestle South	WEST MAIN	2620	Permitted ML	**C**	N/A	N/A	IIS
	L15F	1100	Proposed Perm	**H**	1100	$ 8,071	IFP
	L15F7	90	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L15F8	180	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L15F9	468	Proposed Perm	**M**	468	$ 1,500	IFP
	L15F9A	60	Overgrown/Stable	**L**	0	$ 0.00	IFP
	W96	2260	Proposed Perm	**H**	1562	$12,000	PC
	W96A	540	Proposed Perm	**H**	38	$ 1,250	PC
	W96B	1114	Overgrown/Stable	**L**	0	$ 0.00	BCP
	W96B1	87	Overgrown/Stable	**L**	0	$ 0.00	PC
	W96C	660	Overgrown/Stable	**L**	0	$ 0.00	IFP/PC
	W96D	20	Overgrown/Stable	**L**	0	$ 0.00	PC
TOTALS:		**9,199 m**			**3,168 m**	**$22,821**	

Table 8, Indian/Harold Current Road Status

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Indian	W96	530	Proposed Perm	**H**	530	$ 8,485	PC
	IN-1	1980	Proposed Perm	**M**	1980	$ 4,500	IFP
	IN-2	500	Overgrown/Stable	**L**	0	$ 0.00	IFP
	IN-3	340	Permitted ML	**L**	N/A	$ 0.00	IFP
	IN-4	1600	PC.Upgrade	**C**	1600	$33,500	PC
	IN-5	1280	Overgrown/Stable	**L**	0	$ 0.00	PC
	IN-5A	600	Overgrown/Stable	**L**	0	$ 0.00	PC
	IN-5A1	280	Overgrown/Stable	**L**	0	$ 0.00	PC
	IN-5A2	120	Overgrown/Stable	**L**	0	$ 0.00	PC
	IN-6	670	Proposed Perm	**H**	670	$ 2,500	IFP
	IN-6A	93	Perm Deac 96	**L**	0	$ 0.00	IFP
	IN-6B	253	Proposed Perm	**L**	253	$ 150	IFP
TOTALS:		**8,246 m**			**5,033 m**	**$49,135**	

Table 9, Lostshoe Current Road Status

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Lostshoe	WEST MAIN	2560	Permitted ML	**C**	N/A	N/A	IIS
	EAST MAIN	1400	Permitted ML	**C**	N/A	N/A	IIS
	EM60	150	Overgrown/Stable	**L**	0	$ 0.00	IIS
	EM70	489	Proposed Perm	**H**	489	$ 4,365	IFP
	EM80	120	Overgrown/Stable	**L**	0	$ 0.00	IIS
	E140	709	Partial Deac 97	**L**	468	$ 511	IIS
	E141	1427	Perm Deac 97	**L**	0	$ 0.00	IIS
	E141A	81	Overgrown/Stable	**L**	0	$ 0.00	IIS
	KL650	840	Perm Deac 94	**L**	0	$ 0.00	IFP
	KL655	400	Perm Deac 94	**L**	0	$ 0.00	IFP
	KL656	700	Perm Deac 94	**L**	0	$ 0.00	IFP
	KL622	2877	Perm Deac 95	**L**	0	$ 0.00	IFP
	KL622A	1600	Perm Deac 95	**L**	0	$ 0.00	IFP
	KL622C	149	Perm Deac 95	**L**	0	$ 0.00	IFP
	KL622D	232	Perm Deac 95	**L**	0	$ 0.00	IFP
	KL700	1400	Perm Deac 95	**L**	0	$ 0.00	IFP
	KL702	128	Perm Deac 95	**L**	0	$ 0.00	IFP
	KL705	220	Perm Deac 95	**L**	0	$ 0.00	IFP
	KL750	1200	Perm Deac 95	**L**	0	$ 0.00	IFP
Lostshoe	W100	509	Proposed Perm	**H**	509	$ 2,340	IFP

road status con't	W101	916	Proposed Perm	**C**	916	$ 5,026	IFP
	W200	240	Overgrown/Stable	**L**	0	$ 0.00	IFP
	W300	787	Overgrown/Stable	**L**	0	$ 0.00	IFP
	W300A	319	Overgrown/Stable	**L**	0	$ 0.00	IFP
	W300B	70	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L13	109	Overgrown/Stable	**L**	0	$ 0.00	PC
	L14B	540	N/A	**L**	0	$ 0.00	PC
L14B appears to have been removed by the expansion of the gravel pit into Pacific Rim National Park							
	L15	1986	Proposed Perm	**H**	1986	$ 1,800	IFP
	L15A	188	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L15A1	108	Proposed Perm	**L**	108	$ 454	IFP
	L15B	66	Proposed Perm	**L**	66	$ 313	IFP
	L15C	99	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L15D	237	Overgrown/Stable	**L**	0	$ 0.00	PC
	L15E	93	Overgrown/Stable	**L**	0	$ 0.00	PC
	L15F	620	Proposed Perm	**L**	620	$ 510	PC
	L15F1	430	Overgrown/Stable	**L**	0	$ 0.00	PC
	L15G	137	Overgrown/Stable	**L**	0	$ 0.00	PC
	L16	230	Overgrown/Stable	**L**	0	$ 0.00	PC
	L17	300	Overgrown/Stable	**L**	0	$ 0.00	PC
	L18	212	Overgrown/Stable	**L**	0	$ 0.00	PC
	L19	570	Overgrown/Stable	**L**	0	$ 0.00	PC
	L19A	127	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20	1060	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20A	170	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20A1	100	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20B	290	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20B1	20	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20C	432	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20C1	178	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20C1A	40	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20C2	60	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20D	300	Overgrown/Stable	**L**	0	$ 0.00	PC
	L20E	320	Overgrown/Stable	**L**	0	$ 0.00	PC
	L21	170	Overgrown/Stable	**L**	0	$ 0.00	PC
	L22	1280	Overgrown/Stable	**L**	0	$ 0.00	PC
	L22A	80	Overgrown/Stable	**L**	0	$ 0.00	PC
	L22B	460	Overgrown/Stable	**L**	0	$ 0.00	PC
	L22C	160	Overgrown/Stable	**L**	0	$ 0.00	PC
	Gold Mine Trail	1680	Maintained Access	**L**	0	$ 0.00	PC
	GM1	143	Overgrown/Stable	**L**	0	$ 0.00	PC
	GM2	480	Overgrown/Stable	**L**	0	$ 0.00	PC
	GM3	540	Overgrown/Stable	**L**	0	$ 0.00	PC
	GM4	100	Overgrown/Stable	**L**	0	$ 0.00	PC
	GM5	50	Overgrown/Stable	**L**	0	$ 0.00	PC
	L152	293	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L153	1179	Proposed Perm	**H**	1179	$ 3,500	IFP
	L153A	153	Overgrown/Stable	**L**	0	$ 0.00	IFP
	L154	628	Proposed Perm	**L**	628	$ 390	IFP
	Millstream Rd.	3124	Permitted ML	**H**	N/A	N/A	IFP
TOTALS:		**39,065 m**			**6,969 m**	**$19,209**	

Table10, Salmon Current Road Status

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Salmon	WEST MAIN	1840	Permitted ML	**C**	N/A	N/A	IIS
	E100	2634	Proposed Perm	**C**	2634	$ 9,969	IIS
	E100A	101	Existing Perm	**L**	0	$ 0.00	IIS
	E100B	167	Perm.Deac.97	**L**	0	$ 0.00	IIS
	E110	276	Perm.Deac.97	**L**	0	$ 0.00	IIS
	E110A	40	Existing Perm	**L**	0	$ 0.00	IIS
	E130	513	Perm.Deac.97	**L**	0	$ 0.00	IIS
	E200	2756	Proposed Perm	**C**	2756	$24,495	IIS
	E300	1815	Perm.Deac.97	**L**	0	$ 0.00	IFP
	E301	347	Perm.Deac.97	**L**	0	$ 0.00	IFP
	E302	600	Perm.Deac.97	**L**	0	$ 0.00	IFP
	EAST MAIN	800	Proposed Perm	**C**	800	$ 8,855	IIS
	KL700	1620	Perm.Deac.95	**L**	0	$ 0.00	IFP
	KL701	100	Perm.Deac.95	**L**	0	$ 0.00	IFP
	KL704	318	Perm.Deac.95	**L**	0	$ 0.00	IFP
	KL705.5	140	Perm.Deac.95	**L**	0	$ 0.00	IFP
	KL706	200	Perm.Deac.95	**L**	0	$ 0.00	IFP
TOTALS:		**14,267 m**			**6,190 m**	**$43,319**	

Table 11, Sandhill Current Road Status

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Sandhill	KCR STH	1137	Permitted ML	**H**	N/A	N/A	IIS
	AWP STH	260	Permitted ML	**L**	N/A	N/A	IFP
	BR.1339	759	Proposed Perm	**L**	759	$ 240	IFP
	BR.1339A	70	Overgrown/Stable	**L**	0	$ 0.00	IIS
	BR.1339B	712	Proposed Perm	**L**	712	$ 2,181	IIS
	BR.1339C	414	Overgrown/Stable	**L**	0	$ 0.00	IIS
	BR.1339D	331	Overgrown/Stable	**L**	0	$ 0.00	IIS
	BR.1390	600	Proposed Perm	**M**	600	$ 240	PC
	BR.1390B	120	Overgrown/Stable	**L**	0	$ 0.00	IIS
	SH1	894	Proposed Perm	**L**	894	$ 283	PC
	SH1A	520	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH1A1	126	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH2	120	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH3	380	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH3A	340	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH3A1	96	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH3B	290	Overgrown/Stable	**L**	0	$ 0.00	PC
	Wick. Road	1540	Paved.Maintained	**L**	N/A	$ 0.00	PC
	W1	900	Existing Perm	**L**	0	$ 0.00	PC
	W1A	310	Existing Perm	**L**	0	$ 0.00	PC
	W2	200	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH4	780	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH4A	100	Overgrown/Stable	**L**	0	$ 0.00	PC
	Lagoon Rd.	740	Upgrade PC	**C**	260	$15,000	PC
	L1	40	Overgrown/Stable	**L**	0	$ 0.00	PC
	L2	60	Overgrown/Stable	**L**	0	$ 0.00	PC
	L3	100	Overgrown/Stable	**L**	0	$ 0.00	PC
	L4	170	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH5	1420	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH5A	140	Overgrown/Stable	**L**	0	$ 0.00	PC
	SH5B	28	Overgrown/Stable	**L**	0	$ 0.00	PC

Sandhill road status con't	Landfill Road	1180	Maintained Regional District	**H**	152	$ 1,000	PC
	SH6	250	Maintained PC	**L**	0	$ 0.00	PC
	Old Highway	960	Overgrown/Stable	**L**	0	$ 0.00	PC
TOTALS:		**16,087 m**			**3,377 m**	**$18,944**	

Table 12, Summary of Road Risk and Lengths per Sub-Basin

Watershed	**Risk and Road Length (m)**			
	Critical	**High**	**Moderate**	**Low**
Hospital	**0**	**1,846**	**0**	**2,968**
Kootowis	**15,386**	**25,475**	**2,009**	**50,183**
Staghorn	**8,903**	**19,203**	**2,239**	**26,862**
Trestle	**1,956**	**5,974**	**501**	**3,032**
Trestle South	**2,620**	**2,700**	**468**	**3,411**
Indian/Harold	**1,600**	**1,200**	**1.980**	**3,466**
Lostshoe	**4,876**	**7,287**	**0**	**26,902**
Salmon	**8,030**	**0**	**0**	**6,237**
Sandhill	**260**	**1,289**	**600**	**13,938**
TOTAL	**43,631**	**64,974**	**7,797**	**136,999**
GRAND TOTAL 253,401 m (does not include highway)				

3.2 In-Stream Restoration Planning

Only when the up-slope problems have been addressed, should the lower slope rehabilitation efforts proceed. This aspect has been completed for Kennedy Flats. To determine the current condition, limiting habitat features, critical reaches, and sites for restoration opportunity, a “Fish Habitat Assessment Procedure” (FHAP) is completed.

Based on the FHAP information, site specific, detailed prescriptions (Level II prescriptions) are developed. This will often require the combined efforts of biologists, engineers, geomorphologists, and hydrologists. Once the Level II prescriptions are approved by MWALP, a permit (Section 9) to work in and about a stream is applied for annually and in-stream restoration work proceeds within the established “fish window”.

Given the sheer volume of degraded stream length within the Kennedy Flats area, a method of prioritization was needed to objectively evaluate and summarize priority for stream treatment. By summarizing all major creek systems within the Kennedy Flats area, it is hoped that various user groups and organizations can adopt a coordinated planning approach. This will help ensure the highest return on investment and the quickest route to over-all recovery of impacted stream systems.

The methodology utilized for the prioritization of stream rehabilitation uses a numerical formula, where the higher the number obtained, the higher the priority for rehabilitation. The final number represents the overall risk of not initiating restoration work. The priority rating, or overall risk, is divided into three components: hazard, consequence, and feasibility.

Hazard is the current state of health of a reach/stream system and is based on three components: watershed development, channel condition, and riparian canopy cover. Each sub-component is based on a maximum rating of three and are added together to give the overall hazard rating, to a maximum of a score of nine. *Consequence* is a rating of what the impact on the stream would be if no restoration activities were to be initiated. The maximum score for "Consequence" is nine. By multiplying the *Hazard* rating by the *Consequence* rating the score for *Environmental Risk* can be obtained. *Feasibility* is also divided into three separate sub-components including access feasibility, technical feasibility and fiscal feasibility each out a maximum of three. This gives a maximum feasibility rating of nine (see table13).

It is important to note that the stream restoration approach on Kennedy Flats, is a four phased approach, where the stream restoration must be coordinated with the road deactivation in order not to eliminate important access routes.

- **Phase one:** removal of SWD and reorienting the existing LWD.
- **Phase two:** maintenance, monitoring, and addition of LWD in deficient areas.
- **Phase three:** addition of spawning gravel in deficient areas. This can only be done after the water flow has had sufficient time to scour out accumulated organics, may possibly be implemented during phase two. Stream work is not considered "complete" until phases: one, two, and three have been addressed.
- **Phase four:** Riparian restoration (can be completed concurrently with phase two and three).

Table 13, Creek Risk Template

Creek Risk Assessment Rating

Environmental Risk = Hazard x Consequence
Maximum Score would be 9 x 9 = 81
Overall Risk = Hazard x Consequence x Project Feasibility
Maximum Risk Reduction Rating would be 9 x 9 x 9 = 729

Hazard: Current state of health of a reach/river system based on 3 components: watershed development, channel condition, and riparian canopy to derive a maximum score of 9.

Value	Description
1 to 3	Watershed % harvested/developed: <33% =1, 34 to 66%=2, >67%=3
1 to 3	Channel Condition: Improving = 1, Stable = 2, Degrading = 3
1 to 3	Riparian Canopy: >75% = 1, 51 to 74% = 2, <50% = 3

Consequence: the impact on the stream if no restoration activities were initiated, with a maximum score of 9:

Value	Description
1 to 3	Fish Access *: 1 = Good, 2 = Fair, 3 = Poor
1 to 3	Rearing: 1 = good complexing, 2 = fair complexing, 3 = poor complexing
1 to 3	Spawning: 1 = abundant quality gravel, 2=moderate gravel, 3=low to no gravel

Feasibility: Cost effectiveness (return on investment), with a maximum score of 9:

- **Access *-** (is access by road possible) rating scale:

Value	Description
3 (high)	Access intact / equipment and crew access easily possible (< 10 min.)
2 (mod)	Access intact but overgrown / Reactivation required, walk required (11-19 min.)
1 (low)	Poor access , road no longer usable, or significant distance from road (> 20 min.)

- **Technical-** will work completed using proven techniques reduce risk

Value	Description
3 (high)	Restoration techniques are likely to reduce the environmental risk rating to low (chance of success high)
2 (mod)	Restoration techniques are likely to reduce the environmental risk rating to an acceptable level (chance of success moderate)
1 (low)	Restoration techniques are not likely to reduce the environmental risk rating to an acceptable level/No hazard exists (chance of success low)

- **Fiscal-** can significant habitat improvements be implemented per dollar invested

Value	Description
3 (high)	High productivity increase for investment
2 (mod)	Moderate productivity increase for investment
1 (low)	Low productivity increase for investment

ENVIRONMENTAL RISK

CRITICAL	64 or greater
HIGH	37 to 63
MEDIUM	13 to 36
LOW	1 to 12

OVERALL RISK BREAKDOWN

CRITICAL	567or greater
HIGH	217 to 566
MEDIUM	61 to 216
LOW	Less than 60

*Fish Access-If fish access is due to a gradient or natural barrier, maximum score reverts to 1
*Access-If restoration work is completed, the “Access” score reverts to a maximum of 1

Table 14, Hospital Current Stream Status

Sub-Basin	Stream Segment	Length (m)	Current Status	Overall Risk	Tenure
Hospital	HW1	90	NAR	**L**	PC
	HW2	1130	0	**L**	PC
	HW2A	570	0	**L**	PC
	HW2B	860	0	**L**	PC
	HW2C	1050	0	**M**	PC
	HW3	2540	LWD	**L**	PC
	HW3A	1080	LWD	**L**	PC
	HP1	500	NAR	**L**	PC
	HP1A	540	0	**M**	PC
	HP1A1	520	0	**M**	PC
	HP2	1180	SWD,LWD	**L**	PC
	HP2B	300	SWD,LWD	**L**	PC
TOTALS:		**10.4 km**		**M**	

Table 15, Kootowis Current Stream Status

Sub-Basin	Stream Segment	Length (m)	Current Status	Overall Risk	Tenure
Kootowis	K1	1760	SWD,LWD,RT	**M**	PC
	K1A	1020	SWD,LWD,SG,RT	**L**	PC
	K1B	1540	SWD,LWD,SG,RT	**L**	PC
	K2	2680	SWD	**H**	IIS
	KR1	1840	SWD,LWD	**M**	IIS/IFP
	KR2	2190	SWD,LWD	**M**	IIS/IFP
	KR2A	1080	SWD,LWD	**M**	IFP
	KR2B	640	SWD,LWD	**M**	IFP
	KR2C	420	SWD,LWD	**M**	IIS/IFP
	KR1A	3360	LWD	**H**	IIS/IFP
	KR1A1	1950	LWD	**H**	IIS/IFP
	KR1A2	1020	LWD	**H**	IIS/PC
	K3	3980	SWD,LWD	**H**	IIS/IFP
	K3A	540	SWD,LWD	**H**	IIS
	K3B	3200	SWD,LWD	**H**	IIS/IFP
	K3B1	820	LWD	**H**	IIS
	K3C1	3280	SWD,LWD	**H**	IIS/IFP
	K3C1A	600	SWD,LWD	**H**	IFP
	K3C1B	480	SWD,LWD	**H**	IFP
	K3D1	2900	SWD,LWD	**H**	IFP/IIS
	K3D1A	620	SWD,LWD	**H**	IFP/IIS
	K3D1B	620	SWD,LWD	**H**	IIS/IFP
	K3D1C	520	SWD,LWD	**H**	IFP
	K3E	1500	SWD,LWD	**H**	IFP/IIS
	K3F	1660	SWD,LWD	**H**	IFP
	K3F1	1030	SWD,LWD	**H**	IFP
	K3F2	950	SWD,LWD	**H**	IFP
	K3F2A	620	SWD,LWD	**H**	IFP
	K4	3840	SWD,LWD	**H**	IFP
	K4A	1580	SWD,LWD	**H**	IFP/IIS
	K4B	500	SWD,LWD	**H**	IFP
	K4B1	300	SWD,LWD	**H**	IFP
	K5	2200	LWD	**H**	IFP
	K5A	760	SWD,LWD	**M**	IFP
	K5B	1120	SWD,LWD	**M**	IFP
	K5C	920	SWD,LWD	**M**	IFP
Kootowis	K5C1	830	SWD,LWD	**M**	IFP

stream status con't	KT1	3481	SWD	**H**	IIS/IFP
	KT1A	2010	SWD,LWD	**H**	IIS
	KT1A1	2360	SWD,LWD	**H**	IIS/IFP
	KT1A2	520	SWD,LWD	**H**	IIS
	KT1A3	2120	SWD,LWD	**H**	IFP/IIS
	KIB1	770	LWD	**H**	IIS
	KIB2	700	LWD	**H**	IIS/IFP
	KIB3	1240	LWD	**H**	IIS/IFP
	KIB4	540	LWD	**M**	IFP
	KT1B	1000	SWD,LWD	**M**	IIS
	KT2	1520	LWD	**M**	IIS
	KT2A	1660	LWD	**M**	IIS/IFP
	KT2B	720	LWD	**M**	IIS
	KT2C	860	LWD	**H**	IIS
	KT2D	260	LWD	**H**	IIS
	KT3	1680	SWD,LWD	**H**	IIS/IFP
	KT3A	1280	SWD,LWD	**H**	IIS/ISP
TOTALS:		**77.6 km**		**H**	

Table 16, Staghorn Current Stream Status

Sub-Basin	Stream Segment	Length (m)	Current Status	Overall Risk	Tenure
Staghorn	S1	3020	SWD	**C**	IIS
	S1A	1000	SWD	**C**	IIS
	S1A2	400	SWD	**C**	IIS
	S1A3	200	SWD	**C**	IIS
	S1B	2200	SWD,LWD	**M**	IIS/IFP
	S1B2	1600	0	**H**	IIS/IFP
	S1B2A	600	0	**H**	IIS/IFP
	S1B3A	800	0	**H**	IIS
	S1C	300	SWD	**H**	IFP
	S1D	400	SWD,LWD	**H**	IFP
	S2A	500	SWD,LWD	**H**	IFP
	S2B	800	SWD,LWD	**H**	IFP/IIS
	S2C	2400	SWD,LWD	**H**	IFP/IIS
	SE1	2000	SWD,LWD	**H**	IIS/IFP
	SE1A	1200	SWD,LWD	**H**	IIS/IFP
	SE1B	1000	SWD,LWD	**H**	IFP/IIS
	SE1C	2100	0	**C**	IFP/IIS
	SE2	2800	NAR	**L**	IFP
	SE2A	1200	0	**H**	IFP/IIS
	SE2B	1000	0	**H**	IFP
	SE2C	1000	0	**M**	IFP/IIS
	SE2D	1000	0	**M**	IIS
	SE2E	400	NAR	**L**	IIS
	SE2F	400	NAR	**L**	IIS
	SE2G	600	NAR	**L**	IIS/IFP
	SW1	1800	SWD	**H**	IFP/IIS
	SW1A	2000	LWD	**H**	IIS
	SW1B	3200	0	**H**	IIS/IFP
	SW1C	800	LWD	**H**	IIS
	SW1D	1000	0	**H**	IIS
	SW2	3000	SWD	**H**	IFP
	SW2A	1300	LWD	**H**	IFP
	SW2A1	1400	LWD	**H**	IFP
	SW3	2400	SWD,LWD	**M**	IFP/PC
Staghorn	SW3A	700	SWD,LWD	**M**	IFP/PC

Stream Status con't	SW3B	1400	SWD,LWD	**M**	IFP/PC
TOTALS:		**47.9 km**		**H**	

Table 17, Trestle North Current Stream Status

Sub-Basin	Stream Segment	Length (m)	Current Status	Overall Risk	Tenure
Trestle	TN2	800	LWD	**H**	BCP
	TN1	3600	LWD	**H**	BCP/IIS/IFP
	TN1A1	500	LWD	**H**	IIS
	TN1A2	1000	LWD	**H**	IFP
	TN1A3	1400	LWD	**H**	IFP
	TN1A4	1800	LWD	**H**	IFP/IIS
	TN1A5	2200	LWD	**H**	IFP
	TN1A6	1100	LWD	**H**	IFP/PC
	TN1A7	2300	LWD	**H**	IFP/PC
TOTALS:		**14.7 km**		**H**	

Table 18, Trestle South Current Steam Status

Sub-Basin	Stream Segment	Length (m)	Current Status	Overall Risk	Tenure
Trestle South	TS1A	800	LWD	**M**	IIS/PC
	TS1B	1300	LWD	**H**	IIS/IFP
	TS1B1	1200	LWD	**H**	IIS/IFP
	TS1C1	1200	LWD	**H**	IFP
	TS1C2	700	LWD	**H**	IFP
	TS1C3	1000	LWD	**H**	IFP
	TS2A	800	LWD	**M**	IIS/PC
	TS2B	2600	LWD	**H**	IIS
	TS2B1	1400	NAR	**L**	IIS
	TS2B2	400	NAR	**L**	IFP
	YS2B3	400	NAR	**L**	IFP
	TS2B4	300	NAR	**L**	IFP
	TS2C	1000	LWD	**H**	IFP
TOTALS:		**13.1 km**		**M**	

Table 19, Indian/Harold Current Stream Status

Sub-Basin	Stream Segment	Length (m)	Current Status	Overall Risk	Tenure
Indian/ Harold	INDIAN1	4070	LWD	**H**	IFP/PC
	INDIAN1A	792	LWD	**H**	IFP
	INDIAN1B	1800	LWD	**H**	IFP
	INDIAN1-1	704	LWD	**H**	IFP/PC
	INDIAN1-2	506	LWD	**H**	PC
	INDIAN1-3	352	LWD	**H**	IFP
	INDIAN1-4	348	LWD	**H**	IFP
	INDIAN1B1	616	LWD	**H**	IFP
	INDIAN1-5	726	SWD,LWD	**M**	IFP
	INDIAN1-5A	176	SWD,LWD	**M**	IFP
	INDIAN1-5B	396	SWD,LWD	**M**	IFP
	INDIAN1-6	880	SWD,LWD	**M**	IFP
	INDIAN1-7	418	SWD,LWD	**M**	IFP
	INDIAN1-7A	242	SWD,LWD	**M**	IFP
	INDIAN2	920	LWD	**H**	IFP/PC
TOTALS:		**12.9 km**		**H**	

Table 20, Lostshoe Current Stream Status

Sub-Basin	Stream Segment	Length (m)	Current Status	Overall Risk	Tenure
Lostshoe	LS1	3000	SWD	**H**	PC
	LS1A	500	SWD,LWD	**M**	PC
	LS1B	800	SWD,LWD	**H**	PC
	LS1C	400	SWD,LWD	**M**	PC
	LS2	3000	SWD	**H**	PC/IFP
	LS2A	1700	SWD,LWD	**H**	PC/IFP
	LS3	1600	LWD	**H**	IFP
	LS3A	700	LWD	**M**	IFP
	LS3B1	2000	SWD,LWD	**M**	IFP
	LS3B2	2000	SWD	**H**	IFP/IIS
	LS3B2B	2000	LWD	**H**	IFP/IIS
	LS4	2000	SWD	**H**	IIS/IFP
	LS5	2200	SWG,SG	**H**	IFP
	LS6	11000	NAR	**L**	IFP
TOTALS:		**32.9 km**		**H**	

Table 21, Salmon Current Stream Status

Sub-Basin	Stream Segment	Length (m)	Current Status	Overall Risk	Tenure
Salmon	S1	500	SWD,LWD	**M**	IIS/IFP
	S1A	400	SWD,LWD	**M**	IIS
	S1B	400	0	**M**	IIS/IFP
	S2	2200	SWD	**M**	IIS/IFP
	S3	2400	LWD	**H**	IIS/IFP
	S3A	200	SWD	**C**	IIS
	S3B	800	SWD	**H**	IIS
TOTALS:		**6.9 km**		**H**	

Table 22, Sandhill Current Stream Status

Sub-Basin	Stream Segment	Length (m)	Current Status	Overall Risk	Tenure
Sandhill	SAND1	3240	NAR	**L**	PC
	SAND1-1	1120	NAR	**L**	PC
	SAND1A	2180	NAR	**L**	PC
	SAND1A1	1720	0	**H**	PC
	SAND1A2	2760	0	**H**	PC/WEY
	SAND1A3	1520	SWD,LWD	**H**	PC
	SAND1B	1520	NAR	**L**	PC
	SAND2	1680	SWD,LWD	**H**	PC
	SAND2A	2940	SWD,LWD	**H**	PC
	SAND2A2	1620	NAR	**L**	PC
	SAND2B	1360	SWD,LWD	**H**	PC
	SAND3	3220	NAR	**L**	PC/IFP
TOTALS:		**24.9 km**		**M**	

Table 23, Summary of Stream Risk and Lengths per Sub-Basin

Watershed	Risk and Stream Segment Length (m)				
	Critical	**High**	**Moderate**	**Low**	**Total**
Hospital	0	860	2,110	7,390	10,360
Kootowis	0	20,010	55,021	2,560	77,591
Staghorn	6,720	28,300	8,700	4,200	47,920
Trestle	0	14,700	0	0	14,700
Trestle South	0	9,000	1,600	2,500	13,100
Indian/Harold	0	10,108	2,338	0	12,946
Lostshoe	0	18,300	3,600	11,000	32,900
Salmon	200	3,200	3,500	0	6,900
Sandhill	0	11,980	0	12,900	24,880
TOTAL	**6,920**	**116,458**	**76,869**	**40,550**	**241,297**

3.3 Riparian Restoration Planning

Riparian areas are an essential component of healthy forest and stream ecosystems. Functioning riparian ecosystems provide many of the essential attributes required by fish and other aquatic organisms, including shade, bank stability, protection from flood events, and a recruitment source of large woody debris and coarse woody debris. Approximately 72 percent of terrestrial vertebrates utilize riparian areas highly (CSSP pg. 27).

Non-functioning (or impaired) riparian ecosystems supply poor bank protection and are a poor recruitment supply of large woody debris. This impaired ecosystem will eventually recover, but over an extended period of time (Prichard, 1993).

The Riparian Zone is the area of forest that borders the edges of streams. While "Riparian" and "Stream" have been separated for the purposes of this report, it should be noted that "*this separation disregards the ecological reality that waterbodies and the immediately adjacent environment are ultimately linked by the exchange of water, material, and organisms*" (CSSP pg. 29). This "hydro/riparian affect " is predominant in first 30m along each edge of a larger stream, and falls off dramatically in the next 20m (CSSP, pg. 177, 178). Riparian Vegetation Types (RVT's) are broken into 5 basic classifications (Poulin, Harris, Simmons, 2000) (See appendix 3):

- **RVT 1**: Brush dominated, with poorly stocked conifer component
- **RVT 2**: Over stocked conifer
- **RVT 3**: Deciduous forest over top of a good conifer understory
- **RVT 4**: Deciduous forest with a poor conifer understory
- **RVT 5**: Old growth or very old second growth forest

Each sub-basin requires stratification of the different RVT types. There can then be a focus of treatments of the highest priority RVT's. RVT 1 and RVT 4 are the highest priority for treatment to have maximum immediate benefit for fisheries habitat RVT 2 and RVT 3 are the highest priority for immediate benefit to terrestrial species. These RVT's can be treated to enhance habitat attributes for Vaux's Swift, Pileated and Hairy Woodpeckers, Northwest and Clouded Salamander, Rough Skinned Newt, Black Bear, Martin, Mink, Otter, Bald Eagle (Brown, T. 1995) as well as the identified wildlife species for the Clayoquot area (Ecosection WIM, 1999):

Table 24

Identified Species	Preferred Habitat
Birds:	
Northern Goshawk	Succession forest stages, interspersed patches. Forests exhibiting old growth characteristics. Riparian areas
Cassin's Auklet	Riparian areas. Forests exhibiting old growth characteristics.
Mammals:	
Keen's Long-eared Myotis	Rock or talus slopes. Coarse Woody Debris (logs on the forest floor), snags, cracks and crevices, holes, and hollow interior in standing trees

Alder and brush are shade intolerant colonizing species of disturbed sites and while Alder and brush may be a good nitrogen fixers, they lack adequate root strength for stream bank stability.

Alder is an extremely fast growing tree that puts most of its energy into canopy and stem growth in an effort to maximize its exposure to the sun. As an Alder approaches the end of its' life span, the supporting root structure becomes insufficient to bear the weight of the tree, and if it isn't blown over, it will basically just fall over.

Alder growing close to a river bank will often grow towards the centre of the river to capitalize on the sun light. As the trees grow older and fall over into the river, the upturned root ball creates a divot along the river bank resulting in an erosion "nick point".

Once Alder has fallen into a stream system, it will degrade quickly. While it is beneficial for invertebrate populations (and hence food sources for rearing fry and smolts), its rapid degradation makes it a poor species for in-stream LWD structures. It is these characteristics of Alder that make it a poor dominant riparian species.

Conifers are generally more shade tolerant than deciduous species. Conifers are slower growing but longer lived, so will eventually out compete a deciduous forest. They have a more developed root system, and are therefor more likely to provide stream bank stability. They are also far slower to degrade once in the water, making superior for LWD structures. As a result of these differing characteristics RVT 1 and RVT 4 represent the highest opportunity and priority for recommended treatment (Poulin, Simmons 1998).

Table 25, Hospital Current Riparian Status

Hospital						
	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Total						
Not Treated						
Treated	0	0	0	0	0	0
Unknown	X	X	X	X	X	X

Table 26, Kootowis Current Riparian Status

Kootowis						
	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Total	0.6	76.0	9.0	0.0	15.0	98.6
Not Treated	0.6	38.8	0.0	0.0	15.0	53.8
Treated	0.0	37.2	9.0	0.0	0	46.2
Unknown	0	0	0	0	0	0

Table 27, Staghorn Current Riparian Status

Staghorn						
	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Total						
Not Treated						
Treated	0	0	0	0	0	0
Unknown	X	X	X	X	X	X

Table 28, Trestle Current Riparian Status

Trestle						
	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Total						
Not Treated						
Treated	0	0	0	0	0	0
Unknown	X	X	X	X	X	X

Table 29, Trestle South Current Riparian Status

Trestle South						
	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Total						
Not Treated						
Treated	0	0	0	0	0	0
Unknown	X	X	X	X	X	X

Table 30, Indian Current Riparian Status

Indian/Harold						
	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Total						
Not Treated						
Treated	0	0	0	0	0	0
Unknown	X	X	X	X	X	X

Table 31, Lower Lostshoe Current Riparian Status

Lower Lostshoe (Pacific Rim National Park Portion)						
	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Total	0.6	13.8	24.1	15.8	6.3	60.6
Not Treated	0.6	13.8	24.1	15.8	6.3	60.6
Treated	0	0	0	0	0	0
Unknown	0	0	0	0	0	0

Table 32, Lostshoe Current Riparian Status

Lostshoe (Outside Pacific Rim National Park)						
	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Total	0	24.2	5.9	0	0	30.1
Not Treated	0	24.2	5.9	0	0	30.1
Treated	0	0	0	0	0	0
Unknown	0	0	0	0	0	0

Table 33, Salmon Current Riparian Status

Salmon						
	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Total						
Not Treated						
Treated	0	0	0	0	0	0
Unknown	X	X	X	X	X	X

Table 34, Sandhill Current Riparian Status

Sandhill						
	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Total						
Not Treated						
Treated	0	0	0	0	0	0
Unknown	X	X	X	X	X	X

3.4 Nutrient Replacement Planning

Due to a combination of pre-code logging practices, over harvesting of fish, and climactic conditions, returning runs of Salmon and Steelhead have been reduced significantly. Fish returning to river or stream systems to spawn play an important role in enhancing the nutrients of that stream or river. The nutrients, in turn, have significant impact on the health of aquatic invertebrate populations, which become a primary food source for emerging fry.

When runs of returning fish become depleted, the nutrients they bring to that stream or river system are also reduced, potentially affecting the health of the invertebrate population. Nutrient replacement can help augment the required levels for a healthy food source for emerging fry.

Healthy levels in a stream of Nitrogen and Phosphorus are as low as two parts per billion (or the equivalent of 2 seconds every 33 years). Water sampling can identify any shortfalls in nutrient levels (see Appendix 4, Nutrient Sampling SOP), and a customized blend of slow release fertilizer briquettes can be designed to bring the level of nutrients up to a healthy level.

If a nutrient program is initiated, as the returning numbers of fish improve, the level of nutrient replacement is reduced.

4.0 PROJECT OBJECTIVES

4.1 Roads

- Reduce the residual risk of a road related slope failure to low, where low is defined as the residual risk associated with a similar area without roads (Leslie, M., M. Wise, W.R. Warttig. 1997, Road Deactivation Standards and Guidelines. Ministry of Forests, Pacific Region))
- Improve water quality by restoring surface and subsurface hydrology
- Improve site productivity
- Remove fish passage impediments
- Enhance fish habitat at fish bearing road crossings during deactivation
- Remove or substantially reduce hydrological impact

4.2 Streams

- To address limiting habitat by establishing a more natural frequency of pools, riffles, and glides
- To provide stable spawning and/or rearing habitat
- To speed up the natural recovery process
- To re-establish healthy nutrient levels

4.3 Riparian

The objective of a riparian treatment is to speed up the natural recovery process by re-establishing a more natural frequency of conifer species and promoting the conifer species growth.

4.31 RVT 1 Restoration Objectives

- To re-establish conifers, through planting or release of existing conifers, within the riparian zone to stabilize the channel, reduce bank erosion, and provide a long term recruitment source of LWD
- To reduce brush competition through brushing

4.32 RVT 2 Restoration Objectives

- To reduce conifer densities
- To establish as future recruitment source of LWD
- To enhance old growth attributes
- To create habitat attributes for birds, mammals and amphibians. Particularly identified species where possible.

4.33 RVT 3 Restoration Objectives

- To lower Alder density to reduce conifer competition (low priority)

4.34 RVT 4 Restoration Objectives

- To re-establish conifers, through planting or release of existing conifers, within the riparian zone to stabilize the channel, reduce bank erosion, and provide a long term recruitment source of LWD.
- To lower Alder density to reduce conifer competition

4.35 RVT 5 Restoration Objectives

- No treatment required, but is utilized to develop a template for degraded riparian areas

5.0 CURRENT REPORTS

5.1 Upslope Reports

- Level II Field Assessment Report, Kennedy Flats, Volume I, 1996. *Piteau Associates Engineering ltd. and French Creek Forest Services Ltd.*
- Level II Field Assessment Report, Kennedy Flats, Volume II-Appendix A, 1996. Piteau Associates Engineering ltd. and French Creek Forest Services Ltd.
- Level II Field Assessment Report, Kennedy Flats, Volume III-Appendix B, 1996. Piteau Associates Engineering ltd. and *French Creek Forest Services Ltd.*
- Lostshoe Creek Level II Assessment of Forest Roads, Landslides and Gullies, November 23, 1994, Frank W. Baumann, PEng, Geological Engineer and Daryn Yonin, E.I.T., Geological Engineer
- Landslide and Gully Restoration, Volume 1, Lostshoe, 1997. David F. Polster, M.Sc., RPBio, *Polster Environmental Services*.
- Landslide and Gully Restoration, Volume 2, Lostshoe, 1997. David F. Polster, M.Sc., RPBio, *Polster Environmental Services*.
- Kootowis, Lostshoe, Staghorn Creek Watershed Restoration program Road Crossing prescription Report-July to October 1996 Activities, Jan 1997*. D.R. Clough Consulting*, Warren Warttig
- Road Deactivation Effectiveness Monitoring, Lostshoe-Thunderous Creek Watersheds and Toquart Bay Area, South Island Forest District, July 1999. Mike Leslie, Warren Warttig, RPBio, and Mike Wise, P.Eng.
- Landslide Reclamation Monitoring, Lostshoe and Thunderous Creeks, Clayoquot South, South Island Forest District, March 1998. *Polster Environmental Services.*
- Bio-Engineering Effectiveness Monitoring Pilot Project For Lostshoe and Thunderous Creeks, July 1999. *Long Beach Model Forest*
- Establishment of a Native Seed Industry for the West Coast of Vancouver Island, March 20, 2000. *M. Vaartnou & Associates*

5.2 Stream Reports

- Kootowis, Staghorn and Lostshoe Creeks, Biological Assessment, February 1996. *D.R. Clough Consulting*
- Kootowis, Staghorn and Lostshoe Creeks, Hydrological Assessment, 1996. *Madrone Consultants Ltd*.
- Lost She Creek Hydrologic/Morphologic Impacts of Proposed Fisheries Restoration, 1996. *Northwest Hydraulic Consultants*.
- Kootowis, Staghorn and Lostshoe Creeks Level II Inventory, August 1996. D.R. Clough Consulting
- Lostshoe Creek Avulsion Restoration Plan, February 26, 1996. *Northwest Hydraulic Consultants*
- Kootowis, Staghorn and Lostshoe Creeks Level II Fish Habitat Restoration Plan, June 10, 1997. *D.R. Clough Consulting*

- Instream Rehabilitation Effectiveness Monitoring Report: Kootowis, Staghorn, Lostshoe Creeks, South Island Forest District, August 1999. *D.R. Clough Consulting*, Warren Warttig
- Intensive monitoring of Instream Works: Methodology and Year 1 Results, January 1999. *Babakaiff and Associates Geoscience Inc*.
- Kootowis, Staghorn and Lostshoe Creeks, Winter Restoration Monitoring Report 1998/1999, July 10, 1999. *D.R. Clough Consulting*.
- Kootowis, Staghorn and Lostshoe Creeks, Winter Restoration Monitoring Report 1997/1998, April 15, 1998. *D.R. Clough Consulting*.
- Kootowis, Staghorn and Lostshoe Creeks, Winter Restoration Monitoring and Winter Planning, April 4, 1997. *D.R. Clough Consulting*.
- Kootowis, Staghorn and Lostshoe Creeks, Watershed Restoration Project, Summer Completion Report: Instream Work 2000, May 2001. *D.R. Clough Consulting,* Scott MacDonald, Warren Warttig RPBio.
- Kootowis, Staghorn and Lostshoe Creeks, Watershed Restoration Project, Summer Completion Report: Instream Work 1999, January, 2000. *D.R. Clough Consulting*.
- Kootowis, Staghorn and Lostshoe Creeks, Watershed Restoration Project, Summer Completion Report: Instream Work 1998, May 15, 1999. *D.R. Clough Consulting.*
- Kootowis, Staghorn and Lostshoe Creeks, Watershed Restoration Project, Summer Completion Report: Instream Work 1997, December 15, 1997. *D.R. Clough Consulting*.

5.3 Riparian Reports

- Lostshoe Creek Riparian Assessment and Recommendations for Riparian Restoration (Within Pacific Rim National Park), March 2001. V.A. Poulin, RPBio, A.Sc.For *of V.A. Poulin & Associates Ltd.* Bart Simmons, M.Eng, of *Quillicum Environmental Services Ltd.*
- Lostshoe Creek Riparian Assessment and Recommendations for Riparian Restoration (Above Park Boundary), July 2001. V.A. Poulin, RPBio, A.Sc.For *of V.A. Poulin & Associates Ltd.* Bart Simmons, M.Eng, of *Quillicum Environmental Services Ltd.*
- Kootowis 2000 Riparian Restoration Completion Report, June 2001. V.A. Poulin, RPBio, A.Sc.For *of V.A. Poulin & Associates Ltd.* Bart Simmons, M.Eng, of *Quillicum Environmental Services Ltd.*
- Riparian Assessment: Kootowis Creek Recommended Preliminary Riparian Silviculture Plan, March 1999. V.A. Poulin, RPBio, A.Sc.For *of V.A. Poulin & Associates Ltd.* Bart Simmons, M.Eng, of *Quillicum Environmental Services Ltd.*

5.4 Other

- Park Management Guidelines, 1994. Canada Heritage Parks Canada
- Report 5, Sustainable Ecosystem Management in Clayoquot sound, Planning and Practices. April 1995
- Fish Habitat Inventory & Information Program, Stream Summary Catalogue, Subdistrict #24, Tofino. 1991, 1995. South Coast Division Fisheries Branch Department of Fisheries & Oceans, Vancouver, B.C. Section 3.0

5.0 Completed Activities

5.1 Upslope

6.11 Land Slide and Gully Restoration

Table 35

Lostshoe Creek Landslide Treatment Summary

Gully	Slide	Area (ha)	Hydro Seeding	Bio-Engineering		
				Modified Brush Layers	Live Gully Breaks	Live Bank Protection
P		1.10	1996	33	3	0
S		1.20	1996	76	0	0
Q		1.60	1996	68	9	0
O		0.80	1996	55	0	0
M		0.10	1996	0	0	0
N		0.10	1996	0	0	0
R		1.60	1996	0	0	0
	S	0.84	1996	65	9	0
	T	0.56	1996	96	17	0
	Y	0.60	1996	125	8	0
	X	0.36	1996	78	20	15
	U	0.25	1996	0	0	0
	V	0.18	1996	110	13	4
	W	0.12	1996	42	6	35
	AB	0.32	1996	74	0	0
	AA	0.12	1996	30	0	0
	AC	0.05	1996	55	0	0
	Z	0.06	1996	18	8	0
	1	0.02	1996	17	0	0
	2	0.02	1996	23	3	0
	3	0.02	1996	29	2	0
	4	0.04	1996	45	0	0
TOTAL		**10.06**		**1039**	**98**	**50**

6.12 Completed Road Deactivation

Table 36, Completed Hospital Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Current Risk	Tenure
Hospital	KCR18	2,240	Deactivated 00	L	PC
	KCR18B	240	Overgrown/Stable	L	PC
	KCR18F1	158	Overgrown/Stable	L	PC
	KCR18F2	100	Overgrown/Stable	L	PC
	KCR18G	100	Overgrown/Stable	L	PC
	KCR18H1	130	Overgrown/Stable	L	PC
TOTAL:		**2,968 m**		L	PC

Table 37, Completed Kootowis Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Current Risk	Tenure
Kootowis	KR77	2611	Perm.Deac.97	L	IFP
	KR77A	172	Perm.Deac.97	L	IIS
	KR77B	147	Perm.Deac.97	L	IIS
	KR77C/C1	342	Perm.Deac.97	L	IFP
	KR77D	156	Perm.Deac.97	L	IFP
	KR77D2	406	Perm.Deac.97	L	IFP
	GBR99	580	Overgrown/Stable	L	IIS
	GBR97	180	Overgrown/Stable	L	IIS
	GBR98	1445	Perm.Deac.97	L	IIS
	GBR98-1	440	Overgrown/Stable	L	IIS
	GBR98-2	155	Overgrown/Stable	L	IIS
	GBR98-3	710	Overgrown/Stable	L	IIS
	GBR98-4	30	Overgrown/Stable	L	IIS
	GBR88A	1033	Perm.Deac.96	L	IIS
	GBR88A1	318	Perm.Deac.96	L	IIS
	GBR88B	925	Existing Perm	L	IIS
	GBR88C	255	Perm.Deac.96	L	IIS
	GBR88D	58	Perm.Deac.96	L	IIS
	GBR87	1082	Perm.Deac.96	L	IIS
	GBR87A/A1	300	Perm.Deac.96	L	IIS
	GBR87B	161	Perm.Deac.96	L	IIS
	1BR.6	787	Perm.Deac.97	L	IIS
	BR.153A	1890	Perm.Deac.97	L	IFP
	BR.153A1	948	Perm.Deac.97	L	IFP
	BR.153-10	60	Overgrown/Stable	L	IIS
	BR.153-14	212	Overgrown/Stable	L	IFP
	BR.153-17	125	Overgrown/Stable	L	IFP
	GBR65	408	Perm.Deac.97	L	IIS
	GBR66	206	Overgrown/Stable	L	IIS
	GBR68A1/A1A	206	Overgrown/Stable	L	IIS
	GBR68A2	389	Overgrown/Stable	L	IIS
	GBR68A3	123	Overgrown/Stable	L	IIS
	GB69	700	Perm.Deac.97	L	IIS
	GBR69A	300	Overgrown/Stable	L	IIS
	GBR69A1	100	Overgrown/Stable	L	IIS
	GBR58B/B1	431	Perm.Deac.97	L	IFP
	GBR58C/D/G	249	Overgrown/Stable	L	IFP
	GBR58H	72	Perm.Deac.97	L	IFP
	GBR44	618	Perm.Deac.96	L	IIS
	GBR45B	246	Overgrown/Stable	L	IIS
	GBR42	187	Perm.Deac.96	L	IFP
Kootowis	GBR43	214	Perm.Deac.96	L	IFP

completed road deactivation con't	GBR48	1292	Perm.Deac.96	L	IIS
	GBR48A	249	Overgrown/Stable	L	IIS
	GBR48B/B1	271	Overgrown/Stable	L	IIS
	GBR54A/B	155	Overgrown/Stable	L	IIS
	GBR56	1350	Perm.Deac.96	L	IIS
	GBR56A	886	Perm.Deac.96	L	IIS
	GBR56B	102	Overgrown/Stable	L	IIS
	GBR60	873	Perm.Deac.96	L	IIS
	GBR60A	100	Perm.Deac.96	L	IIS
	GBR-A	173	Perm.Deac.96	L	IIS
	KCR18C	80	Overgrown/Stable	L	PC
	KCR18D	90	Overgrown/Stable	L	IIS
	KCR18E	80	Overgrown/Stable	L	PC
	BR.156	331	Overgrown/Stable	L	IIS
	L104B	1020	Perm.Deac.97	L	IFP
	L104B1/B2	263	Overgrown/Stable	L	IFP
	L104C	1195	Perm.Deac.97	L	IFP
	L104C1/C3	198	Overgrown/Stable	L	IFP
	L104C2	248	Perm.Deac.97	L	IFP
	BR.155	200	Overgrown/Stable	L	IFP
	KCR-A	179	Overgrown/Stable	L	IIS
	GR1	180	Perm.Deac.97	L	IFP
	GR2	100	Perm.Deac.97	L	IIS
	KCR-C1	112	Overgrown/Stable	L	IIS
	BR.110A	296	Overgrown/Stable	L	IFP
	BR110A1	237	Perm.Deac.97	L	IIS
	BR.160	192	Overgrown/Stable	L	IFP
	BR.161	370	Perm.Deac.97	L	IFP
	BR.162	250	Perm.Deac.97	L	IFP
	BR.181	135	Perm.Deac.97	L	IFP
	BR.182A	65	Perm.Deac.97	L	IFP
	BR.183	94	Overgrown/Stable	L	IFP
	BR.130A	90	Overgrown/Stable	L	IFP
	BR.130B	343	Perm.Deac.96	L	IFP
	BR.130C	116	Perm.Deac.96	L	IFP
	BR.132	120	Overgrown/Stable	L	IFP
	BR,140	113	Overgrown/Stable	L	IFP
	L-150	761	Perm.Deac.96	L	IFP
	L-150B/D	187	Overgrown/Stable	L	IFP
	L-150A/C/E	412	Perm.Deac.96	L	IFP
	L120A/B	180	Overgrown/Stable	L	IFP
	L121	596	Perm.Deac.97	L	IFP
	L121A	81	Perm.Deac.97	L	IFP
	L122	398	Perm.Deac.97	L	IFP
	L122A	91	Overgrown/Stable	L	IFP
	L122B	240	Overgrown/Stable	L	IFP
	L123A/C	92	Overgrown/Stable	L	IIS
	L123B	35	Overgrown/Stable	L	IFP
	L124	130	Perm.Deac.96	L	IFP
	L125	131	Perm.Deac.96	L	IFP
	L126	265	Perm.Deac.96	L	IFP
	L127	92	Perm.Deac.96	L	IFP
	L114	303	Perm.Deac.97	L	IFP
	L114A	61	Overgrown/Stable	L	IFP
	L115	612	Perm.Deac.97	L	IFP
	L115A	75	Overgrown/Stable	L	IFP
	L117	108	Perm.Deac.97	L	IFP
Kootowis completed	L102	597	Perm.Deac.97	L	IFP
	L103	410	Perm.Deac.97	L	IFP

road deactivation con't	L104	1423	Perm.Deac.97	L	IFP
	L104A	80	Overgrown/Stable	L	IFP
	L106	180	Perm.Deac.96	L	IFP
	L107	623	Perm.Deac.96	L	IFP
	L108	949	Perm.Deac.96	L	IFP
	L108A	59	Perm.Deac.96	L	IFP
	L108B	123	Perm.Deac.96	L	IFP
	L109	473	Perm.Deac.96	L	IFP
	L109A	470	Perm.Deac.96	L	IIS
	L109B	73	Existing Perm	L	IFP
	L105A	443	Perm.Deac.97	L	IFP
	L105A1	40	Existing Perm	L	IFP
	L105B	111	Existing Perm	L	IFP
	L105E	101	Existing Perm	L	IFP
	L105F	106	Existing Perm	L	IFP
TOTAL:		**43,236 m**		L	

Table 38, Completed Staghorn Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Current Risk	Tenure
Staghorn	L105	2461	Part.Deac.96/97	L	IFP
	L105C	669	Overgrown/Stable	L	IFP
	L105C1	490	Overgrown/Stable	L	IFP
	L105C1A	178	Overgrown/Stable	L	IFP
	L105C2	466	Perm.Deac.97	L	IFP
	L105C2A	36	Overgrown/Stable	L	IFP
	L105D	911	Perm.Deac.96	L	IFP
	L105D1	289	Overgrown/Stable	L	IFP
	L105G	450	Overgrown/Stable	L	IFP
	L105G1	131	Overgrown/Stable	L	IFP
	L105H	483	Overgrown/Stable	L	IFP
	L105HA	119	Perm.Deac.96	L	IFP
	L105HA1	32	Overgrown/Stable	L	IFP
	L105HB	103	Overgrown/Stable	L	IFP
	L105I	84	Overgrown/Stable	L	IFP
	BR.1390A	531	Perm.Deac.97	L	IFP/PC
	BR.1390B	84	Overgrown/Stable	L	IIS
	L-190A	143	Overgrown/Stable	L	IFP
	L-191	395	Perm.Deac.97	L	IFP
	L-191A	90	Overgrown/Stable	L	IFP
	L-192A	274	Overgrown/Stable	L	IFP
	L-192B/C/ C1/F/H/I	840	Overgrown/Stable	L	IFP
	L192D	220	Overgrown/Stable	L	IFP
	L192G	158	Overgrown/Stable	L	IFP
	AWP A	275	Overgrown/Stable	L	IIS
	AWP A1	130	Overgrown/Stable	L	IIS
	AWP B	100	Overgrown/Stable	L	IIS
	L192	1888	Perm.Deac.97	L	IFP
	L192L	610	Overgrown/Stable	L	IFP
	L192L1	94	Overgrown/Stable	L	IFP
	L192M	365	Overgrown/Stable	L	IFP
	L192N	121	Overgrown/Stable	L	IFP
	L193B	725	Perm.Deac.97	L	IFP
	L193C	181	Overgrown/Stable	L	IFP
	L193D	224	Perm.Deac.97	L	IIS
Staghorn completed road	GBR11/12/13	429	Overgrown/Stable	L	IFP
	STAG A/B	276	Overgrown/Stable	L	IIS
	STAG 10/20	487	Overgrown/Stable	L	IIS

deactivation con't	STAG 61	235	Overgrown/Stable	L	IIS
	W10	250	Overgrown/Stable	L	IIS
	W11	435	Overgrown/Stable	L	IIS
	W11A	450	Overgrown/Stable	L	IIS
	W12	315	Overgrown/Stable	L	IIS
	W20	998	Perm.Deac.97	L	IIS
	W21	1350	Perm.Deac.97	L	IIS
	W21A	285	Existing Perm	L	IIS
	W22	35	Existing Perm	L	IIS
	W40	843	Perm.Deac.97	L	IFP
	W41	335	Existing Perm	L	IFP
	W41A	323	Existing Perm	L	IFP
	W50	434	Perm.Deac.97	L	IIS
	W60	606	Existing Perm	L	IFP
	W61	414	Existing Perm	L	IFP
	W70	980	Exist.semi-perm	L	IIS
	W85	138	Overgrown/Stable	L	IFP
TOTAL:		**23,968 m**		L	

Table 39, Completed Trestle Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Current Risk	Tenure
Trestle	TRES.51	198	Perm.Deac.97	L	IFP
	W95A	336	Overgrown/Stable	L	BCP
	L15F2A	195	Overgrown/Stable	L	IIS
	L15F2B	391	Overgrown/Stable	L	IFP
	L15F3	127	Overgrown/Stable	L	IFP
	L15F4	100	Overgrown/Stable	L	IFP
	L15F5A	100	Overgrown/Stable	L	IFP
	L15F6	100	Overgrown/Stable	L	IFP
	SH1A	263	Overgrown/Stable	L	PC
	SH1B	200	Overgrown/Stable	L	PC
	SH1C	123	Overgrown/Stable	L	IFP
	SH1D	56	Overgrown/Stable	L	IFP
TOTAL:		**1,994 m**		L	

Table 40, Completed Trestle South Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Current Risk	Tenure
Trestle South	L15F7	90	Overgrown/Stable	L	IFP
	L15F8	180	Overgrown/Stable	L	IFP
	L15F9A	60	Overgrown/Stable	L	IFP
	W96B	1114	Overgrown/Stable	L	PC
	W96B1	87	Overgrown/Stable	L	PC
	W96C	660	Overgrown/Stable	L	IFP
	W96D	20	Overgrown/Stable	L	PC
TOTAL:		**2,211 m**		L	

Table 41, Completed Indian/Harold Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Current Risk	Tenure
Indian/ Harold	IN-2	500	Overgrown/Stable	L	IFP
	IN-5	1280	Overgrown/Stable	L	PC
	IN-5A	600	Overgrown/Stable	L	PC
	IN-5A1	280	Overgrown/Stable	L	PC
	IN-5A2	120	Overgrown/Stable	L	PC
TOTAL:		**2,780 m**		L	

Table 42, Completed Lostshoe Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Current Risk	Tenure
Lostshoe	EM60	150	Overgrown/Stable	L	IIS
	EM80	120	Overgrown/Stable	L	IIS
	E141	1427	Perm Deac 97	L	IIS
	E141A	81	Overgrown/Stable	L	IIS
	KL650	840	Perm Deac 94	L	IFP
	KL655	400	Perm Deac 94	L	IFP
	KL656	700	Perm Deac 94	L	IFP
	KL622	2877	Perm Deac 95	L	IFP
	KL622A	1600	Perm Deac 95	L	IFP
	KL622C	149	Perm Deac 95	L	IFP
	KL622D	232	Perm Deac 95	L	IFP
	KL700	1400	Perm Deac 95	L	IFP
	KL702	128	Perm Deac 95	L	IFP
	KL705	220	Perm Deac 95	L	IFP
	KL750	1200	Perm Deac 95	L	IFP
	W200	240	Overgrown/Stable	L	IFP
	W300	787	Overgrown/Stable	L	IFP
	W300A	319	Overgrown/Stable	L	IFP
	W300B	70	Overgrown/Stable	L	IFP
	L13	109	Overgrown/Stable	L	PC
	L15A	188	Existing Perm	L	IFP
	L15C	99	Existing Perm	L	IFP
	L15D	237	Overgrown/Stable	L	PC
	L15E	93	Overgrown/Stable	L	PC
	L15F1	430	Overgrown/Stable	L	PC
	L15G	137	Overgrown/Stable	L	PC
	L16	230	Overgrown/Stable	L	PC
	L17	300	Overgrown/Stable	L	PC
	L18	212	Overgrown/Stable	L	PC
	L19	570	Overgrown/Stable	L	PC
	L19A	127	Overgrown/Stable	L	PC
	L20	1060	Overgrown/Stable	L	PC
	L20A	170	Overgrown/Stable	L	PC
	L20A1	100	Overgrown/Stable	L	PC
	L20B	290	Overgrown/Stable	L	PC
	L20B1	20	Overgrown/Stable	L	PC
	L20C	432	Overgrown/Stable	L	PC
	L20C1	178	Overgrown/Stable	L	PC
	L20C1A	40	Overgrown/Stable	L	PC
	L20C2	60	Overgrown/Stable	L	PC
	L20D	300	Overgrown/Stable	L	PC
	L20E	320	Overgrown/Stable	L	PC
	L21	170	Overgrown/Stable	L	PC

Lostshoe completed road deactivation con't	L22	1280	Overgrown/Stable	L	PC
	L22A	80	Overgrown/Stable	L	PC
	L22B	460	Overgrown/Stable	L	PC
	L22C	160	Overgrown/Stable	L	PC
	GM1	143	Overgrown/Stable	L	PC
	GM2	480	Overgrown/Stable	L	PC
	GM3	540	Overgrown/Stable	L	PC
	GM4	100	Overgrown/Stable	L	PC
	GM5	50	Overgrown/Stable	L	PC
	L152	293	Overgrown/Stable	L	IFP
	L153A	153	Overgrown/Stable	L	IFP
TOTAL:		**22,551 m**		L	

Table 43, Completed Salmon Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Current Risk	Tenure
Salmon	E100A	101	Overgrown/Stable	L	IIS
	E100B	167	Perm.Deac.97	L	IIS
	E110	276	Perm.Deac.97	L	IIS
	E110A	40	Overgrown/Stable	L	IIS
	E130	513	Perm.Deac.97	L	IIS
	E300	1815	Perm.Deac.97	L	IFP
	E301	347	Perm.Deac.97	L	IFP
	E302	600	Perm.Deac.97	L	IFP
	KL700	1620	Perm.Deac.95	L	IFP
	KL701	100	Perm.Deac.95	L	IFP
	KL704	318	Perm.Deac.95	L	IFP
	KL705.5	140	Perm.Deac.95	L	IFP
	KL706	200	Perm.Deac.95	L	IFP
TOTAL:		**6,237 m**		L	

Table 44, Completed Sandhill Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Current Risk	Tenure
Sandhill					
	BR.1339A	70	Overgrown/Stable	L	IIS
	BR.1339B	712	Overgrown/Stable	L	IIS
	BR.1339C	414	Overgrown/Stable	L	IIS
	BR.1339D	331	Overgrown/Stable	L	IIS
	BR.1390B	120	Overgrown/Stable	L	IIS
	SH1A	520	Overgrown/Stable	L	PC
	SH1A1	126	Overgrown/Stable	L	PC
	SH2	120	Overgrown/Stable	L	PC
	SH3	380	Overgrown/Stable	L	PC
	SH3A	340	Overgrown/Stable	L	PC
	SH3A1	96	Overgrown/Stable	L	PC
	SH3B	290	Overgrown/Stable	L	PC
	W1	900	Perm.Deac.	L	PC
	W1A	310	Perm.Deac.	L	PC
	W2	200	Overgrown/Stable	L	PC
	SH4	780	Overgrown/Stable	L	PC
	SH4A	100	Overgrown/Stable	L	PC
	L1	40	Overgrown/Stable	L	PC
	L2	60	Overgrown/Stable	L	PC
	L3	100	Overgrown/Stable	L	PC
	L4	170	Overgrown/Stable	L	PC
	SH5	1420	Overgrown/Stable	L	PC
Sandhill	SH5A	140	Overgrown/Stable	L	PC

completed road deac con't	SH5B	28	Overgrown/Stable	L	PC
	Old Highway	960	Overgrown/Stable	L	PC
TOTAL:		**8,015 m**		**L**	

Table 45, Summary of Completed Road Deactivation

Sub-Basin	Length (m)
Hospital	2,968
Kootowis	43,236
Staghorn	23,968
Trestle	1,994
Trestle South	2,211
Indian/Harold	2,780
Lostshoe	22,551
Salmon	6,237
Sandhill	8,015
TOTAL:	**113,960 m**

5.2 Completed In-Stream Restoration

Table 46, Hospital completed stream restoration

Sub-Basin	Creek	Length (m)	Current Status	Tenure
Hospital	HW1	90	Old Growth	PC
	HP1	500	Old Growth	PC
TOTAL:		**590**		

Table 47, Kootowis completed stream restoration

Sub-Basin	Creek	Length (m)	Current Status	Tenure
Kootowis	K1A	1020	Old Growth	PC
	K1B	1540	Old Growth	PC
TOTAL:		**2,560**		

Table 48, Staghorn completed stream restoration

Sub-Basin	Creek	Length (m)	Current Status	Tenure
Staghorn	SE2	2800	Old Growth	IFP
	SE2E	400	Old Growth	IIS
	SE2F	400	Old Growth	IIS
	SE2G	600	Old Growth	IIS/IFP
TOTAL:		**4,200**		

Table 49, Trestle completed stream restoration

Sub-Basin	Creek	Length (m)	Current Status	Tenure
Trestle	None	0	N/A	-
TOTAL:		**0**		

Table 50, Trestle South completed stream restoration

Sub-Basin	Creek	Length (m)	Current Status	Tenure
Trestle South	TS2B1	1400	Old Growth	IIS
	TS2B2	400	Old Growth	IFP
	TS2B3	400	Old Growth	IFP
	TS2B4	300	Old Growth	IFP
TOTAL:		**2,500**		

Table 51, Indian/Harold completed stream restoration

Sub-Basin	Creek	Length (m)	Current Status	Tenure
Indian/ Harold	None	0	N/A	-
TOTAL:		**0**		

Table 52, Lostshoe completed stream restoration

Sub-Basin	Creek	Length (m)	Current Status	Tenure
Lostshoe	LS6	11000	Headwaters restored	IFP
TOTAL:		**11,000**		

Table 53, Salmon completed stream restoration

Sub-Basin	Creek	Length (m)	Current Status	Tenure
Salmon	None	0	0	-
TOTAL:		**0**		

Table 54, Sandhill completed stream restoration

Sub-Basin	Creek	Length (m)	Current Status	Tenure
Sandhill	SAND1	3240	Old Growth	PC
	SAND1-1	1120	Old Growth	PC
	SAND1A	2180	Old Growth	PC
	SAND1B	1520	Old Growth	PC
	SAND2A2	1620	Old Growth	PC
	SAND3	3220	Old Growth	PC/IFP
TOTAL:		**12,900**		

Table 55, Summary of completed stream restoration

Sub-Basin	Length (m)
Hospital	590
Kootowis	2,560
Staghorn	4,200
Trestle	0
Trestle South	2,500
Indian/Harold	0
Lostshoe	11,000
Salmon	0
Sandhill	12,900
TOTAL:	**22,750**

5.3 Riparian

Areas recorded in each table are summarized from survey data. The summarized areas are subject to change as additional surveys are completed.

Table 56, Summary of Completed Riparian Restoration

	RVT 1 (ha)	RVT 2 (ha)	RVT 3 (ha)	RVT 4 (ha)	RVT 5 (ha)	Total (ha)
Hospital	0	0	0	0	0	0
Kootowis	0	37.2	9.0	0	0	46.2
Staghorn	0	0	0	0	0	0
Trestle	0	0	0	0	0	0
Trestle South	0	0	0	0	0	0
Indian/Harold	0	0	0	0	0	0
Lostshoe	0	0	0	0	0	0
Salmon	0	0	0	0	0	0
Sandhill	0	0	0	0	0	0
TOTAL	**0**	**37.2**	**9.0**	**0**	**0**	**46.2**

6.0 WORKPLAN

6.1 Road Deactivation Prescription Work Plan

Table 57, Road Prescription Work Plan

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Cost	Tenure
Hospital	KCR18 *	1400	*Deactivated*	L	$381.90	PC
	KCR18F	1060	Proposed Perm	M	$781.98	PC
	KCR18H	786	Proposed Perm	H	$874.55	PC
	Access to KCR18H is by way of KCR18. KCR18 has been deactivated. A reactivation prescription will be required for KCR18 in order to access KCR18H.					
	Sub-Total	**3,246 m**			**$2038.43**	
Kootowis	GBR30	587	Proposed Perm	M	$245.95	IFP
	GBR31	124	Proposed Perm	L	$167.23	IFP
	KCR15	2215	Proposed Perm	H	$1043.35	IIS
	KCR15B	227	Proposed Perm	M	$181.02	IIS
	BR.100 LWR	3680	Proposed Perm	C	$1406.55	IFP
	BR.100 UPR	4075	Proposed Perm	C	$1406.55	IFP
	KCR C	435	Proposed Perm	M	$348.25	IIS
	Sub-Total	**11,343 m**			**$4798.90**	
Staghorn	L194	691	Proposed Perm	M	$504.32	IFP
	W5	720	Proposed Perm	H	$1101.19	IIS
	W80	1040	Proposed Perm	H	$980.95	IIS
	Sub-Total	**2,451 m**			**$2586.46**	
Trestle	W95	1623	Proposed Perm	H	$980.95	IIS/BCP
	L15F	900	Proposed Perm	H	$967.10	IFP
	L15F5	318	Proposed Perm	H	$305.35	IFP
	SH1	1370	Proposed Perm	H	$1378.86	IFP
	Sub-Total	**4,211 m**			**$3632.26**	
Trestle S	L15F	1100	Proposed Perm	H	$490.47	IFP
	L15F9	468	Proposed Perm	M	$397.91	IFP
	W96	1562	Proposed Perm	H	$1563.98	IIS/PC
	W96A	540	Proposed Perm	H	$198.95	IIS
	Sub-Total	**3,670 m**			**$2651.31**	

Road Prescription Workplan Con't

Indian/ Harold	W96	530	Proposed Perm	H	$397.91	PC
	IN-1	1980	Proposed Perm	H	$1536.30	IFP
	IN-4	1600	Proposed Perm	C	$3052.50	PC
Sub-Total		**4,110 m**			**$4986.71**	
Lostshoe	L15	807	Proposed Perm	H	$500.83	IFP
	L153	243	Proposed Perm	H	$600.38	IFP
Sub-Total		**1,050 m**			**$1101.21**	
Lostshoe (Park)	L15	1179	Proposed Perm	H	$295.00	PC
	L15F	620	Proposed Perm	L	$232.16	PC
	L153	936	Proposed Perm	H	$288.00	PC
Sub-Total		**2,735 m**			**$ 815.16**	
Sandhill	BR.1339	759	Proposed Perm	L	$478.12	IFP
	BR.1339B	712	Proposed Perm	L	$348.26	IIS
	BR.1390	600	Proposed Perm	M	$749.55	PC
	SH1	894	Proposed Perm	L	$491.96	PC
	LAGOON RD	260	Proposed Perm	C	$1776.25	PC
	LANDFILL RD	152	Proposed Perm	H	$926.25	PC
Sub-Total		**3,377 m**			**$4770.39**	
TOTALS:		**36,193 m**			**$27,380.83**	

6.2 Road Deactivation Work Plan

Table 58, Hospital Proposed Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Hospital	KCR 18F	1060	Proposed Perm	**H**	1060	$ 4,552	PC
	KCR18H	786	Proposed Perm	**H**	786	$ 2,000	PC
TOTALS:					**1,846 m**	**$ 6,552**	

Table 59, Kootowis Proposed Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Kootowis	GBR88	1260	Partial.Deac.96	**C**	476	$ 6,800	IIS
	BR.153	1900	Partial.Deac.98	**C**	1487	$ 4,000	IFP
	GBR30	587	Proposed Perm	**M**	587	$ 413	IFP
	GBR31	124	Proposed Perm	**L**	124	$ 200	IFP
	GBR68	686	Proposed Perm	**H**	686	$ 2,340	IIS
	GBR68A	25	Partial.Deac.97	**L**	25	$ 340	IIS
	GBR58	2022	Partial.Deac.97	**H**	1437	$13,244	IIS
	GBR58E/E1/E2	616	Proposed Perm	**H**	616	$ 1,850	IIS
	GBR58F	196	Proposed Perm	**H**	196	$ 8,433	IFP
	GBR45	1358	Proposed Perm	**C**	1358	$ 8,216	IIS
GBR45 deactivation cost will increase significantly, as a bridge is required for access.							
	GBR45A	425	Proposed Perm	**H**	425	$ 1,483	IIS
	GBR.WEST	2795	Upgrade	**C**	2795	$60,117	IIS
	GBR54	1302	Partial.Deac.97	**L**	4	$ 335	IIS
	KCR15	2215	Proposed Perm	**H**	1571	$ 5,592	IIS
	KCR15A	485	Proposed Perm	**C**	485	$ 2,340	IIS
	KCR15B	227	Proposed Perm	**M**	227	$ 560	IIS
	KCR18	1304	Proposed Perm	**H**	1304	$ 3,875	IIS
	KCR18A	264	Proposed Perm	**H**	264	$ 2,686	IIS
	KCR18B	560	Proposed Perm	**H**	560	$ 2,340	IIS
	KCR-B	224	Proposed Perm	**L**	224	$ 175	IIS

Kootowis	Gun Road	840	Upgrade	**H**	10	$ 30	IFP

proposed road deac prescriptions con't	KCR-C	435	Proposed Perm	**M**	435	$ 93	IIS
	BR.180	1030	Proposed Perm	**C**	1030	$ 3,117	IFP
	BR.182	301	Partial.Deac.97	**L**	69	$ 146	IFP
	BR.130	1520	Partial.Deac.96	**H**	804	$ 2,558	IFP
	L120	2309	Partial.Deac.97	**H**	1923	$16,235	IFP
	L123	1239	Proposed Perm	**L**	1239	$ 3,567	IFP
	L123D	293	Proposed Perm	**L**	293	$ 372	IIS
	L123D1	100	Proposed Perm	**L**	100	$ 102	IIS
	L104	1423	Partial.Deac.97	**H**	805	$ 3,350	IFP
	BR.100 LWR	3680	Proposed Perm	**C**	3680	$ 8,383	IFP
	BR.100 UPR	4075	Proposed Perm	**C**	4075	$17,508	IFP
	KCR STH	4750	Permitted ML	**H**	N/A	N/A	IIS
	KCR NTH	3800	Permitted ML	**H**	N/A	N/A	IIS
	KRR	6100	Permitted ML	**H**	N/A	N/A	IIS
	AWP STH	760	Permitted ML	**M**	N/A	N/A	IFP
TOTALS:					**29,314m**	**$179,266**	

Table 60, Staghorn Proposed Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Staghorn	L105	2461	Partial.Deac.97	**H**	1572	$ 1,680	IFP
	BR.1390	748	Proposed Perm	**C**	748	$ 3,056	IFP/PC
	L-190	793	Proposed Perm	**M**	793	$ 3,057	IFP
	L194	732	Proposed Perm	**M**	77	$ 1,181	IFP
	L192J	386	Proposed Perm	**M**	386	$ 695	IFP
	AWP.NORTH	2515	Proposed Perm	**C**	2515	$10,057	IFP
	L193	1130	Partial.Deac.97	**L**	281	$ 219	IFP
	GBR10	948	Proposed Perm	**H**	948	$ 3,372	IFP
	STAG ML	3365	Proposed Perm	**H**	3365	$19,431	IIS
Note: STAG ML costs will be higher due to the requirement for bridge access							
	STAG 30	983	Proposed Perm	**M**	983	$ 6,782	IIS
	STAG 31	330	Proposed Perm	**H**	330	$ 3,050	IIS
	STAG 40	338	Proposed Perm	**L**	338	$ 1,092	IIS
	STAG 50	875	Proposed Perm	**L**	875	$ 2,015	IIS
	STAG 60	210	Proposed Perm	**L**	210	$ 140	IIS
	T.MAIN.WEST	888	Proposed Perm	**H**	888	$ 2,340	IIS
	WEST MAIN	5640	Permitted ML	**C**	N/A	N/A	IIS
	W5	720	Proposed Perm	**H**	720	$ 2,349	IIS
	W10	905	Partial.Deac.97	**H**	342	$ 2,552	IIS
	W80	1040	Proposed Perm	**H**	1040	$ 4,784	IIS
	W90	746	Proposed Perm	**L**	746	$ 1,343	IFP
	KRR	1975	Permitted ML	**H**	N/A	N/A	IIS
	AWP STH	4278	Permitted ML	**H**	N/A	N/A	IFP
	GBR.EAST	3245	Permitted ML	**H**	N/A	N/A	IFP
	TR.ML EST	500	FDP Upgrade	**H**	N/A	N/A	IIS
TOTALS:					**17,157 m**	**$69,195**	

Table 61, Trestle Proposed Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Trestle	TRES.40	438	FDP Upgrade	**L**	N/A	N/A	IFP
	TRES.50	405	Proposed Perm	**L**	405	$ 256	IFP
	WESTMAIN	1956	Permitted ML	**C**	N/A	N/A	IIS
	W95	1623	Proposed Perm	**H**	1623	$ 8,133	IIS
	L15F	900	Proposed Perm	**H**	900	$ 2,456	IFP
	L15F2	501	Proposed Perm	**M**	501	$ 240	IIS
	L15F5	318	Proposed Perm	**H**	318	$ 1,248	IFP
	TR.ML.EST	1763	FDP Upgrade	**H**	N/A	N/A	IIS
	SH1	1370	Proposed Perm	**H**	1370	$ 6,998	IFP
TOTALS:					**5,312 m**	**$19,331**	

Table 62, Trestle South Proposed Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Trestle South	WEST MAIN	2620	Permitted ML	**C**	N/A	N/A	IIS
	L15F	1100	Proposed Perm	**H**	1100	$ 8,071	IFP
	L15F9	468	Proposed Perm	**M**	468	$ 1,500	IFP
	W96	2260	Proposed Perm	**H**	1562	$12,000	PC
	W96A	540	Proposed Perm	**H**	38	$ 1,250	IFP
TOTALS:					**3,168 m**	**$22,821**	

Table 63, Indian/Harold Proposed Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Indian/ Harold	W96	530	Proposed Perm	**H**	530	$ 8,485	PC
	IN-1	1980	Proposed Perm	**M**	1980	$ 4,500	IFP
	IN-4	1600	Park Access	**C**	1600	$33,500	IFP/PC
	IN-6	670	Proposed Perm	**H**	670	$ 2,000	PC
	IN-6 B	253	Proposed Perm	**L**	253	$ 650	PC
TOTALS:					**5,033 m**	**$49,135**	

Table 64, Lostshoe Proposed Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Lostshoe	WEST MAIN	2560	Permitted ML	**C**	N/A	N/A	IIS
	EAST MAIN	1400	Permitted ML	**C**	N/A	N/A	IIS
	EM70	489	Proposed Perm	**H**	489	$ 4,365	IFP
	E140	709	Partial Deac 97	**L**	468	$ 511	IIS
	W100	509	Proposed Perm	**H**	509	$ 2,340	IFP
	W101	916	Proposed Perm	**C**	916	$ 5,026	IFP
	L15	1986	Proposed Perm	**H**	1986	$ 1,800	IFP
	L15A1	108	Proposed Perm	**L**	108	$ 454	IFP
	L15B	66	Proposed Perm	**L**	66	$ 313	IFP
	L15F	620	Proposed Perm	**L**	620	$ 510	PC
	L153	1179	Proposed Perm	**H**	1179	$ 3,500	PC
	L154	628	Proposed Perm	**L**	628	$ 390	PC
	MILLSTRM RD	3124	Permitted ML	**H**	N/A	N/A	IFP
TOTALS:					**6,969 m**	**$19,209**	

Table 65, Salmon Proposed Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Salmon	WEST MAIN	1840	Permitted ML	**C**	N/A	N/A	IIS
	E100	2634	Proposed Perm	**C**	2634	$ 9,969	IIS
	E200	2756	Proposed Perm	**C**	2756	$24,495	IIS
	EAST MAIN	800	Proposed Perm	**C**	800	$ 8,855	IIS
TOTALS:					**6,190 m**	**$43,319**	

Table 66, Sandhill Proposed Road Deactivation

Sub-Basin	Road	Length (m)	Current Status	Overall Risk	Deac Length (m)	Cost	Tenure
Sandhill	KCR STH	1137	Permitted ML	**H**	N/A	N/A	IIS
	BR.1339	759	Proposed Perm	**L**	759	$ 240	IFP
	BR.1339B	712	Proposed Perm	**L**	712	$ 2,181	IIS
	BR.1390	600	Proposed Perm	**M**	600	$ 240	IFP
	SH1	894	Proposed Perm	**L**	894	$ 283	PC
	Lagoon Rd	740	Maintain PC	**C**	260	$15,000	PC
	Landfill Rd	1180	Mntnd.Reg.District	**H**	152	$ 1,000	PC
TOTALS:					**3,377 m**	**$18,944**	

Table 67, Proposed Road Deactivation Summary

Sub-Basin	Risk	Length	Current Status	Cost
Hospital	**C**	0	N/A	$ 0.00
	H	1846	Proposed.Perm	$ 6,552
	M	1060	Proposed.Perm	$ 0.00
	L	0	N/A	$ 0.00
	Sub-Total:	**1,846**		**$ 6,552**
Kootowis	**C**	15386	Proposed.Perm	$107,952
	H	10601	Proposed.Perm	$ 64,016
	M	1249	Proposed.Perm	$ 1,066
	L	2078	Proposed.Perm	$ 5,237
	Sub-Total:	**29,314**		**$178,271**
Staghorn	**C**	3263	Proposed.Perm	$ 13,113
	H	8875	Proposed.Perm	$ 39,558
	M	2239	Proposed.Perm	$ 11,715
	L	2780	Proposed.Perm	$ 4,809
	Sub-Total:	**17,157**		**$ 69,195**
Trestle	**C**	0	N/A	$ 0.00
	H	4211	Proposed.Perm	$ 18,835
	M	501	Proposed.Perm	$ 240
	L	405	Proposed.Perm	$ 256
	Sub-Total:	**5,117**		**$ 19,331**
Trestle South	**C**	0	N/A	$ 0.00
	H	2700	Proposed.Perm	$ 21,321
	M	468	Proposed.Perm	$ 1,500
	L	0	N/A	$ 0.00
	Sub-Total:	**3,168**		**$ 22,821**
Indian/ Harold	**C**	1600	Upgrade PC	$ 33,500
	H	530	Proposed.Perm	$ 8,485
	M	1980	Proposed.Perm	$ 4,500
	L	0	N/A	$ 0.00
	Sub-Total:	**4,110**		**$ 46,485**
Lostshoe	**C**	916	Proposed.Perm	$ 5,026
	H	4163	Proposed.Perm	$ 12,005
	M	0	N/A	$ 0.00
	L	1890	Proposed.Perm	$ 2,178
	Sub-Total:	**6,969**		**$ 19,209**
Salmon	**C**	6190	Proposed.Perm	$ 43,319
	H	0	N/A	$ 0.00
	M	0	N/A	$ 0.00
	L	0	N/A	$ 0.00
	Sub-Total:	**6,190**		**$ 43,319**
Sandhill	C	260	Proposed.Perm	$ 15,000
	H	152	Proposed.Perm	$ 1,000
	M	600	Proposed.Perm	$ 240
	L	2365	Proposed.Perm	$ 2,704
	Sub-Total:	**3,337**		**$ 18,944**
TOTALS:		**77,403 m**		**$424,127**

6.3 Landslide Revegetation Prescription Work Plan

All Landslide revegetation prescriptions have been completed.

6.4 Hydro-Seeding Work Plan

Table 68

Sub-Basin	Unit	Area	Risk	Cost	Tenure
Lostshoe	S1-92F003-199	17.2 ha	M	$ 25,800	IFP
	S5-92F003-206	72.7 ha	M	$109,050	IFP
TOTAL:		**89.9 ha**	**M**	**$134,850**	**IFP**

6.5 Bio-Engineering Prescription Work Plan

All Landslide bio-engineering prescriptions have been completed.

6.6 Bio-Engineering Work Plan

Table 69

Sub-Basin	Unit	Area	Risk	Cost	Tenure
Lostshoe	S1-92F003-199	17.2 ha	M	$ 17,200	IFP
	S5-92F003-206	72.7 ha	M	$72,700	IFP
TOTAL:		**89.9 ha**	**M**	**$89,900**	**IFP**

6.7 FHAP Report Work Plan and Water Sampling

All FHAP report work has been completed. Water sampling should be done twice per year (see Appendix 4, Nutrient Sampling SOP). Costs are estimated to be $1,500 annually, all inclusive.

6.8 Level II In-Stream Prescription Work Plan

All overview and Level II prescriptions have been completed

6.9 In-Stream Restoration Work Plan

The In-Stream Restoration Work plan is broken down into sub basins for the work area. Each area has Small Wood Debris (SWD), Large Wood Debris (LWD) and Spawning Gravel (SG). The Current Status, Overall Risk and Costs are taken from our Sub Basin Creek Risk Summary Table (Appendix 6). The Costs for the restoration activities are based on average cost over several years from similar activities in the area.

Table 70, Hospital Stream Restoration Workplan

Stream	Length (m)	Current Status	Overall Risk	SWD $	LWD $	SG $	Total $
HW2	1130	0	L	$ 1,130	$ 1,130	$ 1,130	$ 3,390
HW2A	570	0	L	$ 570	$ 570	$ 570	$ 1,710
HW2B	860	0	H	$ 860	$ 860	$ 860	$ 2,580
HW2C	1050	0	M	$ 1,050	$ 1,050	$ 1,050	$ 3,150
HW3	2540	LWD	L	$ 2,540	$ 0.00	$ 2,540	$ 5,080
HW3A	1080	LWD	L	$ 1,080	$ 0.00	$ 1,080	$ 2,160
HP1A	540	0	M	$ 540	$ 540	$ 540	$ 1,620
HP1A1	520	0	M	$ 520	$ 520	$ 520	$ 1,560
HP2	1180	SWD,LWD	L	$ 0.00	$ 0.00	$ 1,180	$ 1,180
HP2B	300	SWD,LWD	L	$ 0.00	$ 0.00	$ 300	$ 300
TOTAL	**9,770**		**M**	**$ 8,290**	**$ 4,670**	**$ 9,770**	**$ 22,730**

Table 71, Kootowis Stream Restoration Workplan

Stream	Length (m)	Current Status	Overall Risk	SWD $	LWD $	SG $	Total $
K1 (Lower ms)	1760	SWD,LWD,RT	M	$ 0.00	$ 0.00	$ 8,800	$ 8,800
K2	2680	SWD	H	$ 0.00	$107,200	$ 13,400	$120,600
KR1	1840	SWD,LWD	M	$ 0.00	$ 0.00	$ 1,840	$ 1,840
KR2	2190	SWD,LWD	M	$ 0.00	$ 0.00	$ 2,190	$ 2,190
KR2A	1080	SWD,LWD	M	$ 0.00	$ 0.00	$ 1,080	$ 1,080
KR2B	640	SWD,LWD	M	$ 0.00	$ 0.00	$ 640	$ 640
KR2C	420	SWD,LWD	M	$ 0.00	$ 0.00	$ 420	$ 420
KR1A	3360	LWD	H	$ 3,360	$ 0.00	$ 3,360	$ 6,720
KR1A1	1950	LWD	H	$ 1,950	$ 0.00	$ 1,950	$ 3,900
KR1A2	1020	LWD	H	$ 1,020	$ 0.00	$ 1,020	$ 2,040
K3(Grice Bay)	3980	SWD,LWD	H	$ 0.00	$ 0.00	$ 9,950	$ 9,950
K3A	540	SWD,LWD	H	$ 0.00	$ 0.00	$ 540	$ 540
K3B	3200	SWD,LWD	H	$ 0.00	$ 0.00	$ 3,200	$ 3,200
K3B1	820	LWD	H	$ 820	$ 0.00	$ 820	$ 1,640
K3C1	3280	SWD,LWD	H	$ 0.00	$ 0.00	$ 3,280	$ 3,280
K3C1A	600	SWD,LWD	H	$ 0.00	$ 0.00	$ 600	$ 600
K3C1B	480	SWD,LWD	H	$ 0.00	$ 0.00	$ 480	$ 480
K3D1 (Williams Ck)	2900	SWD,LWD	H	$ 0.00	$ 0.00	$ 2,900	$ 2,900
K3D1A	620	SWD,LWD	H	$ 0.00	$ 0.00	$ 620	$ 620
K3D1B	620	SWD,LWD	H	$ 0.00	$ 0.00	$ 620	$ 620
K3D1C	520	SWD,LWD	H	$ 0.00	$ 0.00	$ 520	$ 520
K3E	1500	SWD,LWD	H	$ 0.00	$ 0.00	$ 1,500	$ 1,500
K3F	1660	SWD,LWD	H	$ 0.00	$ 0.00	$ 1,660	$ 1,660
K3F1	1030	SWD,LWD	H	$ 0.00	$ 0.00	$ 1,030	$ 1,030
K3F2	950	SWD,LWD	H	$ 0.00	$ 0.00	$ 950	$ 950
K3F2A	620	SWD,LWD	H	$ 0.00	$ 0.00	$ 620	$ 620
K4(Upper MS)	3840	SWD,LWD	H	$ 0.00	$ 0.00	$ 9,600	$ 9,600
K4A	1580	SWD,LWD	H	$ 0.00	$ 0.00	$ 1,580	$ 1,580
K4B	500	SWD,LWD	H	$ 0.00	$ 0.00	$ 500	$ 500
K4B1	300	SWD,LWD	H	$ 0.00	$ 0.00	$ 300	$ 300
K5	2200	LWD	H	$ 2,200	$ 0.00	$ 2,200	$ 4,400
K5A	760	SWD,LWD	M	$ 0.00	$ 0.00	$ 760	$ 760

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K5B	1120	SWD,LWD	M	$ 0.00	$ 0.00	$ 1,120	$ 1,120

K5C	920	SWD,LWD	M	$ 0.00	$ 0.00	$ 920	$ 920
K5C1	830	SWD,LWD	M	$ 0.00	$ 0.00	$ 830	$ 830
KT1 (Tofino Creek m/s)	3481	SWD	H	$ 0.00	$ 3,481	$ 8,703	$ 12,184
KT1A	2010	SWD,LWD	H	$ 0.00	$ 0.00	$ 2,010	$ 2,010
KT1A1	2360	SWD,LWD	H	$ 0.00	$ 0.00	$ 2,360	$ 2,360
KT1A2	520	SWD,LWD	H	$ 0.00	$ 0.00	$ 520	$ 520
KT1A3	2120	SWD,LWD	H	$ 0.00	$ 0.00	$ 2,120	$ 2,120
KIB1(Indian Bay Creek)	770	LWD	H	$ 770	$ 0.00	$ 770	$ 1,540
KIB2	700	LWD	H	$ 700	$ 0.00	$ 700	$ 1,400
KIB3	1240	LWD	H	$ 1,240	$ 0.00	$ 1,240	$ 2,480
KIB4	540	LWD	M	$ 540	$ 0.00	$ 540	$ 1,080
KT1B	1000	SWD,LWD	M	$ 0.00	$ 0.00	$ 1,000	$ 1,000
KT2	1520	LWD	M	$ 1,520	$ 0.00	$ 1,520	$ 3,040
KT2A	1660	LWD	M	$ 1,660	$ 0.00	$ 1,660	$ 3,320
KT2B	720	LWD	M	$ 720	$ 0.00	$ 720	$ 1,440
KT2C	860	LWD	H	$ 860	$ 0.00	$ 860	$ 1,720
KT2D	260	LWD	H	$ 260	$ 0.00	$ 260	$ 520
KT3	1680	SWD,LWD	H	$ 0.00	$ 0.00	$ 1,680	$ 1,680
KT3A	1280	SWD,LWD	H	$ 0.00	$ 0.00	$ 1,280	$ 1,280
Summary:	**75,031**		**H**	**$ 17,620**	**$110,681**	**$109,743**	**$238,044**

Table 72, Staghorn Stream Restoration Workplan

Stream	Length (m)	Current Status	Overall Risk	SWD $	LWD $	SG $	Total $
S1(Mainstem)	3020	SWD	C	$ 0.00	$120,800	$ 15,100	$135,900
S1A	1000	SWD	C	$ 0.00	$ 20,000	$ 2,500	$ 22,500
S1A2	400	SWD	C	$ 0.00	$ 8,000	$ 1,000	$ 9,000
S1A3	200	SWD	C	$ 0.00	$ 4,000	$ 500	$ 4,500
S1B	2200	SWD,LWD	M	$ 0.00	$ 0.00	$ 5,500	$ 5,500
S1B2	1600	0	H	$ 1,600	$ 1,600	$ 1,600	$ 4,800
S1B2A	600	0	H	$ 600	$ 600	$ 600	$ 1,800
S1B3A	800	0	H	$ 800	$ 800	$ 800	$ 2,400
S1C	300	SWD	H	$ 0.00	$ 6,000	$ 750	$ 6,750
S1D	400	SWD,LWD	H	$ 0.00	$ 0.00	$ 1,000	$ 1,000
S2A	500	SWD,LWD	H	$ 0.00	$ 0.00	$ 500	$ 500
S2B	800	SWD,LWD	H	$ 0.00	$ 0.00	$ 800	$ 800
S2C	2400	SWD,LWD	H	$ 0.00	$ 0.00	$ 2,400	$ 2,400
SE1-EastFork	2000	SWD,LWD	H	$ 0.00	$ 0.00	$ 5,000	$ 5,000
SE1A	1200	SWD,LWD	H	$ 0.00	$ 0.00	$ 3,000	$ 3,000
SE1B	1000	SWD,LWD	H	$ 0.00	$ 0.00	$ 2,500	$ 2,500
SE1C	2100	0	C	$ 2,100	$ 2,100	$ 2,100	$ 6,300
SE2A	1200	0	H	$ 1,200	$ 1,200	$ 1,200	$ 3,600
SE2B	1000	0	H	$ 10,000	$ 0.00	$ 2,500	$ 12,500
SE2C	1000	0	H	$ 10,000	$ 0.00	$ 2,500	$ 12,500
SE2D	1000	0	H	$ 10,000	$ 0.00	$ 2,500	$ 12,500
SW1WestFork	1800	SWD	H	$ 0.00	$ 72,000	$ 9,000	$ 81,000
SW1A	2000	LWD	H	$ 2,000	$ 0.00	$ 5,000	$ 7,000
SW1B	3200	0	H	$ 3,200	$ 3,200	3,200$	$ 9,600

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SW1C	800	LWD	H	$ 800	$ 0.00	$ 800	$ 1,600
SW1D	1000	0	H	$ 1,000	$ 1,000	$ 1,000	$ 3,000

SW2	3000	SWD	H	$ 0.00	$ 3,000	$ 7,500	$ 10,500
SW2A	1300	LWD	H	$ 1,300	$ 0.00	$ 1,300	$ 2,600
SW2A1	1400	LWD	H	$ 1,400	$ 0.00	$ 1,400	$ 2,800
SW3	2400	LWD	M	$ 2,400	$ 0.00	$ 2,400	$ 4,800
SW3A	700	SWD,LWD	M	$ 0.00	$ 0.00	$ 700	$ 700
SW3B	1400	SWD,LWD	M	$ 0.00	$ 0.00	$ 1,400	$ 1,400
TOTAL	**43,720**		**H**	**$ 48,400**	**$244,300**	**$ 88,050**	**$380,750**

Table 73, Trestle Stream Restoration Workplan

Stream	Length (m)	Current Status	Overall Risk	SWD $	LWD $	SG $	Total $
TN2	800	LWD	H	$ 8,000	$ 0.00	$ 2,000	$ 10,000
TN1	3600	LWD	H	$ 36,000	$ 0.00	$ 9,000	$ 45,000
TN1A1	500	LWD	H	$ 5,000	$ 0.00	$ 1,250	$ 6,250
TN1A2	1000	LWD	H	$ 10,000	$ 0.00	$ 2,500	$ 12,500
TN1A3	1400	LWD	H	$ 14,000	$ 0.00	$ 3,500	$ 17,500
TN1A4	1800	LWD	H	$ 18,000	$ 0.00	$ 4,500	$ 22,500
TN1A5	2200	LWD	H	$ 22,000	$ 0.00	$ 5,500	$ 27,500
TN1A6	1100	LWD	H	$ 11,000	$ 0.00	$ 2,750	$ 13,750
TN1A7	2300	LWD	H	$ 23,000	$ 0.00	$ 5,750	$ 28,750
TOTAL	**14,700**		**H**	**$147,000**	**$ 0.00**	**$ 36,750**	**$183,750**

Table 74, Trestle South Stream Restoration Workplan

Stream	Length (m)	Current Status	Overall Risk	SWD $	LWD $	SG $	Total $
TS1A (Trestle Creek 1)	800	LWD	M	$ 8,000	$ 0.00	$ 2,000	$ 10,000
TS1B	1300	LWD	H	$ 13,000	$ 0.00	$ 3,250	$ 16,250
TS1B1	1200	LWD	H	$ 12,000	$ 0.00	$ 3,000	$ 15,000
TS1C1	1200	LWD	H	$ 12,000	$ 0.00	$ 3,000	$ 15,000
TS1C2	700	LWD	H	$ 7,000	$ 0.00	$ 1,750	$ 8,750
TS1C3	1000	LWD	H	$ 10,000	$ 0.00	$ 2,500	$ 12,500
TS2A (Trestle Creek 2)	800	LWD	M	$ 8,000	$ 0.00	$ 2,000	$ 10,000
TS2B	2600	LWD	H	$ 26,000	$ 0.00	$ 6,500	$ 32,500
TS2C	1000	LWD	H	$ 10,000	$ 0.00	$ 2,500	$ 12,500
TOTAL	**10,600**		**M**	**$106,000**	**$ 0.00**	**$ 26,500**	**$132,500**

Table 75, Indian/Harold Stream Restoration Workplan

Stream	Length (m)	Current Status	Overall Risk	SWD $	LWD $	SG $	Total $
INDIAN1	4070	LWD	H	$ 40,700	$ 0.00	$ 10,175	$ 50,875
INDIAN1A	792	LWD	H	$ 7,920	$ 0.00	$ 1,980	$ 9,900
INDIAN1B	1800	LWD	H	$ 18,000	$ 0.00	$ 4,500	$ 22,500
INDIAN1-1	704	LWD	H	$ 7,040	$ 0.00	$ 1,760	$ 8,800
INDIAN1-2	506	LWD	H	$ 5,060	$ 0.00	$ 1,265	$ 6,325
INDIAN1-3	352	LWD	H	$ 3,520	$ 0.00	$ 880	$ 4,400
INDIAN1-4	348	LWD	H	$ 3,480	$ 0.00	$ 870	$ 4,350
INDIAN1B1	616	LWD	H	$ 6,160	$ 0.00	$ 1,540	$ 7,700
INDIAN1-5	726	SWD,LWD	M	$ 0.00	$ 0.00	$ 1,815	$ 1,815

Indian/Harold Stream Restoration Workplan Con't

INDIAN1-5A	176	SWD,LWD	M	$ 0.00	$ 0.00	$ 440	$ 440
INDIAN1-5B	396	SWD,LWD	M	$ 0.00	$ 0.00	$ 990	$ 990

INDIAN1-6	880	SWD,LWD	M	$ 0.00	$ 0.00	$ 2,200	$ 2,200
INDIAN1-7	418	SWD,LWD	M	$ 0.00	$ 0.00	$ 1,045	$ 1,045
INDIAN1-7A	242	SWD,LWD	M	$ 0.00	$ 0.00	$ 605	$ 605
INDIAN2	920	LWD	H	$ 920	$ 0.00	$ 2,300	$ 3,220
TOTAL	**12,946**		**H**	**$ 91,880**	**$ 0.00**	**$ 32,365**	**$125,165**

Table 76, Lostshoe Stream Restoration Workplan

Stream	Length (m)	Current Status	Overall Risk	SWD $	LWD $	SG $	Total $
LS1	3000	SWD	H	$ 0.00	$ 60,000	$ 7,500	$ 67,500
LS1A	500	SWD,LWD	M	$ 0.00	$ 0.00	$ 500	$ 500
LS1B	800	SWD,LWD	H	$ 0.00	$ 0.00	$ 800	$ 800
LS1C	400	SWD,LWD	M	$ 0.00	$ 0.00	$ 400	$ 400
LS2	3000	SWD	H	$ 0.00	$ 60,000	$ 7,500	$ 67,500
LS2A	1700	SWD,LWD	H	$ 0.00	$ 0.00	$ 1,700	$ 1,700
LS3	1600	LWD	H	$ 64,000	$ 0.00	$ 4,000	$ 68,000
LS3A	700	LWD	M	$ 700	$ 0.00	$ 700	$ 1,400
LS3B1	2000	SWD,LWD	M	$ 0.00	$ 0.00	$ 2,000	$ 2,000
LS3B2	2000	SWD	H	$ 0.00	$ 40,000	$ 2,000	$ 42,000
LS3B2B	2000	LWD	H	$ 20,000	$ 0.00	$ 2,000	$ 22,000
LS4	2000	SWD	H	$ 0.00	$ 40,000	$ 2,000	$ 42,000
LS5	2200	SWD,SG	H	$ 0.00	$ 44,000	$ 0.00	$ 44,000
TOTAL	**21,900**		**H**	**$ 84,700**	**$244,000**	**$ 31,100**	**$359,800**

Table 77, Salmon Stream Restoration Workplan

Stream	Length (m)	Current Status	Overall Risk	SWD $	LWD $	SG $	Total $
S1	500	SWD,LWD	M	$ 0.00	$ 0.00	$ 1,250	$ 1,250
S1A	400	SWD,LWD	M	$ 0.00	$ 0.00	$ 400	$ 400
S1B	400	0	M	$ 400	$ 400	$ 400	$ 1,200
S2	2200	SWD	M	$ 0.00	$ 44,000	$ 5,500	$ 49,500
S3	2400	LWD	H	$ 24,000	$ 0.00	$ 2,400	$ 26,400
S3A	200	SWD	C	$ 0.00	$ 4,000	$ 500	$ 4,500
S3B	800	SWD	H	$ 0.00	$ 16,000	$ 800	$ 16,800
TOTAL	**6,900**		**H**	**$ 24,400**	**$ 64,400**	**$ 11,250**	**$100,050**

Table 78, Sandhill Stream Restoration Workplan

Stream	Length (m)	Current Status	Overall Risk	SWD $	LWD $	SG $	Total $
SAND1A1	1720	0	H	$ 1,720	$ 1,720	$ 1,720	$ 5,160
SAND1A2	2760	0	H	$ 2,760	$ 2,760	$ 2,760	$ 8,280
SAND1A3	1520	SWD,LWD	H	$ 1,520	$ 0.00	$ 1,520	$ 3,040
SAND2	1680	SWD,LWD	H	$ 0.00	$ 0.00	$ 1,680	$ 1,680
SAND2A	2940	SWD,LWD	H	$ 0.00	$ 0.00	$ 2,940	$ 2,940
SAND2B	1360	SWD,LWD	H	$ 0.00	$ 0.00	$ 1,360	$ 1,360
TOTAL	**11,900**		**H**	**$ 6,000**	**$ 4,480**	**$ 11,980**	**$ 22,460**

Table 79, Summary Stream Restoration Workplan

Sub-Basin	Risk	Length	Proposed Treatment			
			SWD	LWD	SG	Total
Hospital	C	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
	H	860	$ 860	$ 860	$ 860	$ 2,580
	M	2,110	$ 2,110	$ 2,110	$ 2,110	$ 6,330
	L	6,800	$ 5,320	$ 1,700	$ 6,800	$ 13,820
Sub-Total:		**9,770**	**$ 8,290**	**$ 4,670**	**$ 9,770**	**$ 22,730**
Kootowis	C	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
	H	58,031	$ 13,180	$110,681	$ 85,703	$209,564
	M	17,000	$ 4,440	$ 0.00	$ 24,040	$ 28,480
	L	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Sub-Total:		**75,031**	**$ 17,620**	**$110,681**	**109,743$**	**$238,044**
Staghorn	C	6,720	$ 2,100	$154,900	$ 21,200	$178,200
	H	28,300	$ 23,900	$ 89,400	$ 51,850	$165,150
	M	8,700	22,400	$ 0.00	$ 15,000	$ 37,400
	L	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Sub-Total:		**43,720**	**$ 48,400**	**$244,300**	**$ 88,050**	**$380,750**
Trestle	C	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
	H	14,700	$147,000	$ 0.00	$ 36,750	$183,750
	M	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
	L	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Sub-Total:		**14,700**	**$147,000**	**$ 0.00**	**$ 36,750**	**$183,750**
Trestle South	C	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
	H	9,000	$ 90,000	$ 0.00	$ 22,500	$112,500
	M	1,600	$ 16,000	$ 0.00	$ 4,000	$ 20,000
	L	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Sub-Total:		**10,600**	**$106,000**	**$ 0.00**	**$ 26,500**	**$132,500**
Indian/ Harold	C	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
	H	10,108	$ 92,800	$ 0.00	$ 24,785	$117,585
	M	2,838	$ 0.00	$ 0.00	$ 7,580	$ 7,580
	L	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Sub-Total:		**12,946**	**$ 92,800**	**$ 0.00**	**$ 32,365**	**$125,165**
Lostshoe	C	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
	H	18,300	$ 84,000	$244,000	$ 27,500	$355,500
	M	3,600	$ 700	$ 0.00	$ 3,600	$ 4,300
	L	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Sub-Total:		**21,900**	**$ 84,700**	**$244,000**	**$ 31,100**	**$359,800**
Salmon	C	200	$ 0.00	$ 4,000	$ 500	$ 4,500
	H	3,200	$ 24,000	$ 16,000	$ 3,200	$ 43,200
	M	3,500	$ 400	$ 44,400	$ 7,550	$ 52,350
	L	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Sub-Total:		**6,900**	**$ 24,000**	**$ 64,400**	**$ 11,250**	**$100,050**
Sandhill	C	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
	H	11,980	$ 6,000	$ 4,480	$ 11,980	$ 22,460
	M	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
	L	0	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Sub-Total:		**11,980**	**$ 6,000**	**$ 4,480**	**$ 11,980**	**$ 22,460**
TOTALS:		**207,467**	**$535,210**	**$672,531**	**$357,508**	**$1,565,249**

6.10 Nutrient Replacement Program

Until water sample nutrient analysis indicates lower levels of organic nitrogen and phosphorous, there is no nutrient replacement planned.

6.11 Riparian Prescription Work Plan

Table 80, Riparian Prescription Work Plan

Sub-Basin	Current Risk	Approximate Area (ha)	Cost
Hospital	M	3	$ 2,000
Kootowis	H	53	$ 8,000
Staghorn	H	133	$ 20,000
Trestle	H	61	$ 8,000
Trestle South	H	32	$ 8,000
Indian/Harold	M	20	$ 8,000
Lostshoe	M	25	$ 7,000
Salmon	H	26	$ 8,000
Sandhill	M	28	$ 8,000
TOTAL	**H**	**381**	**$ 77,000**

6.12 Riparian Restoration Work Plan

Table 81, Hospital Riparian Restoration Work Plan

RVT Type	Area (Est. ha)	Current Risk	Cost Estimate
1	Unknown	C	Unknown
2	Unknown	L	Unknown
3	Unknown	M	Unknown
4	Unknown	H	Unknown
TOTAL	**3**	**M**	**$ 8,400**

Table 82, Kootowis Riparian Restoration Work Plan

RVT Type	Area (Est. ha)	Current Risk	Cost Estimate
1	Unknown	C	$ 1,400
2	Unknown	H	$124,109
3	Unknown	M	$ 0.00
4	Unknown	C	$ 0.00
TOTAL	**114**	**H**	**$319,200**

Table 83, Staghorn Riparian Restoration Work Plan

RVT Type	Area (Est. ha)	Current Risk	Cost Estimate
1	Unknown	C	Unknown
2	Unknown	H	Unknown
3	Unknown	M	Unknown
4	Unknown	C	Unknown
TOTAL	**133**	**H**	**$372,000**

Table 84, Trestle Riparian Restoration Work Plan

RVT Type	Area (Est. ha)	Current Risk	Cost Estimate
1	Unknown	C	Unknown
2	Unknown	H	Unknown
3	Unknown	M	Unknown
4	Unknown	C	Unknown
TOTAL	**61**	**H**	**$170,800**

Table 85, Trestle South Riparian Restoration Work Plan

RVT Type	Area (Est. ha)	Current Risk	Cost Estimate
1	Unknown	C	Unknown
2	Unknown	H	Unknown
3	Unknown	M	Unknown
4	Unknown	C	Unknown
TOTAL	**32**	**H**	**$89,600**

Table 86, Indian/Harold Riparian Restoration Work Plan

RVT Type	Area (Est. ha)	Current Risk	Cost Estimate
1	Unknown	C	Unknown
2	Unknown	H	Unknown
3	Unknown	M	Unknown
4	Unknown	C	Unknown
TOTAL	**20**	**M**	**$56,000**

Table 87, Lostshoe Riparian Restoration Work Plan

RVT Type	Area (Est. ha)	Current Risk	Cost Estimate
1	Unknown	C	Unknown
2	Unknown	H	Unknown
3	Unknown	M	Unknown
4	Unknown	C	Unknown
TOTAL	**116**	**C**	**$324,800**

Table 88, Salmon Riparian Restoration Work Plan

RVT Type	Area (Est. ha)	Current Risk	Cost Estimate
1	Unknown	C	Unknown
2	Unknown	H	Unknown
3	Unknown	M	Unknown
4	Unknown	C	Unknown
TOTAL	**26**	**H**	**$72,800**

Table 89, Sandhill Riparian Restoration Work Plan

RVT Type	Area (Est. ha)	Current Risk	Cost Estimate
1	Unknown	C	Unknown
2	Unknown	H	Unknown
3	Unknown	M	Unknown
4	Unknown	C	Unknown
TOTAL	**28**	**M**	**$78,400**

Table 90, Summary Riparian Restoration Work Plan

Sub-Basin	Area (Est. ha)	Current Risk	Cost Estimate
Hospital	3	M	$ 8,400
Kootowis	114	H	$ 319,200
Staghorn	133	H	$ 372,000
Trestle	61	H	$ 170,800
Trestle South	32	H	$ 89,600
Indian/Harold	20	M	$ 56,000
Lostshoe	116	C	$ 324,800
Salmon	26	H	$ 72,800
Sandhill	28	M	$ 78,400
TOTAL	**533 ha**	**H**	**$1,492,000**

6.13 Monitoring Work Plan

Roads: Routine Monitoring will occur each year for the first three years following completion of a deactivated road system, then every five years after that until it is deemed no longer necessary to continue.
Streams: Routine Monitoring will occur each year for the first three years following completion of an in-stream project, then every five years after that until it is deemed no longer necessary to continue.
Riparian: Routine Monitoring will occur every five years after completion of a riparian project until it is deemed no longer necessary to continue.
Nutrient Replacement: When a nutrient replacement program is initiated, water sampling is usually taken annually until the Nutrient Replacement program is no longer deemed necessary. No nutrient replacement is planned for Kennedy Flats.

Table 91, Ten Year Monitoring Plan

Title	10 yr Cost
Road Monitoring Program	$ 35,000
Stream Monitoring Program	$ 84,000
Riparian Monitoring Program	$ 50,000
Nutrient Monitoring Program	$ 7,000
TOTAL	**$176,000**

6.14 Year One Work Plan

Table 92

Sub-Basin	Roads		Streams				Riparian		Monitoring Costs
	Deac	Cost	SWD	LWD	SG	Cost	Prescription Cost	Treatment Cost	
Kootowis	* GBR 45	$8,216	-	-	K3C1	$3,280		$50,000	
	GBR 45A	$1,483		K2	K2	$120,600			
	GBR 88	$6,800			K3C1A	$ 600			
	KCR15A	$2,340			K3C1B	$ 480			
	**KCR15	$5,592			K3D1	$2,900			
	**KCR15B	$ 560			K3D1A	$ 620			
					K3D1B	$ 620			
					K3D1C	$ 520			
	GBR68	$2,340			K3E	$1,500			
	***Br180	$3,117			KT1A	$2,010			
					KT1A1	$2,360			
					KT1A2	$ 520			
					KT1A3	2,120			
					K3F	$1,660			
					K3F1	$1,030			
					K3F2	$ 950			
					K3F2A	$ 620			
					K4A	$1,050			
					K3	$9,950			
					K3A	$ 540			
					K3B	$3,200			
					K3B1	$ 820			
			K5			$2,200			
			KR1A			$3,360			
			KR1A1			$1,950			
			KR1A2			$1,020			
Lostshoe	W101	$5,026							
Staghorn				S1	S1	$135,900	$16,000		
				S1A	S1A	$22,500			
			SE1C			$2,100			
TOTAL		**$35,474**				**$326,980**	**$16,000**	**$50,000**	

*Complete stream restoration on stream reach K3C1 (Kootowis) prior to deactivating GBR45
**Road terminates in PC
***Complete stream restoration on stream reach KT1A (Kootowis) prior to deactivating Br180

6.15 Year Two Work Plan

Table 93

Sub-Basin	Roads		Streams				Riparian		Monitoring Costs
	Deac	Cost	SWD	LWD	SG	Cost	Prescription Cost	Treatment Cost	
Kootowis	BR. 130	$2,558							
	L123	$3,567							
	L123D	$ 372							
	L123D1	$ 102							
	L120	$16,235							
	BR 100 UPR	$17,508							
	BR 100 LWR	$8,383							
TOTAL									

6.16 Year Three Work Plan

Table 94

Sub-Basin	Roads		Streams				Riparian		Monitoring Costs
	Deac	Cost	SWD	LWD	SG	Cost	Prescription Cost	Treatment Cost	
TOTAL									

7.0 Summary

The potential for successful fish and forest ecosystem restoration, combined with the high productivity potential of the Kennedy Flats watershed unit, make it an extremely good candidate for restoration investment. Results of restoration, and enhancement efforts so far, combined with continued ecosystem based harvesting, has indicated strongly that degraded ecosystems can be successfully restored concurrently with sensitive resource extraction.

Figure 8

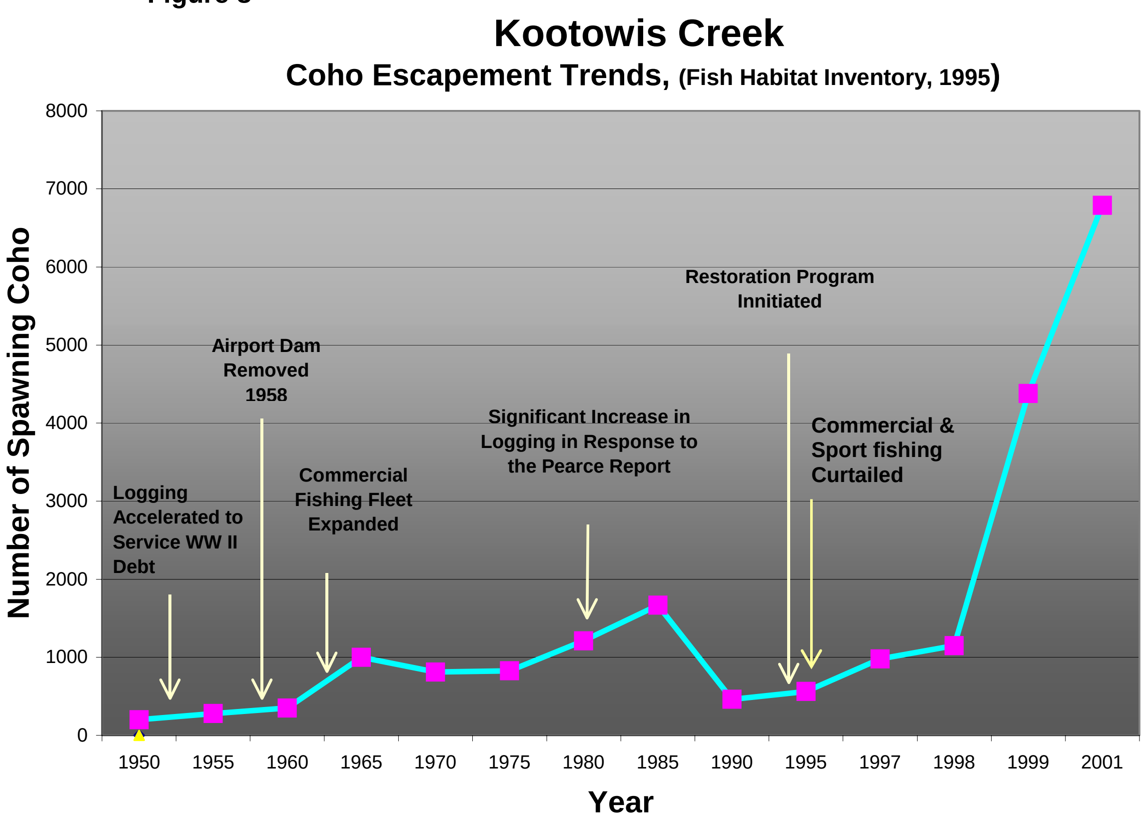


Table 95: Summary of Known Restoration Investment Requirements

Activity	RISK C	RISK H	RISK M	RISK L	TOTAL
Road Deactivation Prescriptions	$ 7,642	$ 14,663	$ 3,209	$ 1,867	$ 27,381
Road Deactivation	$ 217,910	$ 171,772	$ 19,261	$ 15,184	$ 424,127
Hydro Seeding	$ 0.00	$ 0.00	$ 134,850	$ 0.00	$ 134,850
Bio-Engineering	$ 0.00	$ 0.00	$ 89,900	$ 0.00	$ 89,900
Stream Restoration	$ 182,700	$1,212,289	$ 156,440	$ 13,820	$1,565,249
Riparian Prescriptions	$ 0.00	$ 52,000	$ 25,000	$ 0.00	$ 77,000
Riparian Restoration	$ 324,800	$1,024,400	$ 142,800	$ 0.00	$1,492,000
Monitoring	$ 0.00	$ 176,000	$ 0.00	$ 0.00	$ 176,000
TOTAL	**$ 733,052**	**$2,651,124**	**$ 571,460**	**$ 30,871**	**$3,986,507**

The activities listed in this report may change with new or better information. This report is meant to be a living document, for purposed of coordinating restoration investments by different local and government organizations. As restoration work is completed, the tables will require upgrading.

The activities identified are not necessarily the responsibility of the licensee or Tenure holder.

8.0 References

- Bisson, P.A., T.P. Quinn, G.H. Reeves, and S.V.Gregory, 1992. Best management practices, cumulative effects, and long-term trends in fish abundance in Pacific Northwest river systems. Pages 189-232
- Brown, R.F., M.J. Comfort and D.E. Marshall. 1979. Catalogue of salmon streams and spawning escapements of statistical area 24 (Clayoquot sound). Fisheries and marine Service Report No. 80.
- Brown, T. 1995. Snags and wildlife tree preservation and enhancement. Wildlife/stand level biodiversity workshop proceedings, p. 91-96. P. Bradford, T. Manning, and B. I'Anson, editors. Ministry of Environment, Lands, and Parks, Victoria, B.C.
- Brown, T.G., I.V. Williams and R.T.E. Pulfer. 1987. Watershed data base: Clayoquot Sound, Vancouver Island. Can. Data Rep. Fish. Aquat. Sci. 668. 83p.
- Canada Heritage Parks Canada. 1994. Park Management Guidelines
- Fish Habitat Inventory & Information Program, Stream Summary Catalogue, Subdistrict #24, Tofino. 1991, 1995. South Coast Division Fisheries Branch Department of Fisheries & Oceans, Vancouver, B.C. Section 3.0
- Frissel, C.A. 1993. Topology of extinction and endangerment of native fishes in the Pacific Northwest and California. Conservation Biology 7:342-354
- Identified Wildlife Management Strategy. 1999. Ministry of Water, Land, and Air Protection, www.env.gov.bc.ca/wld/
- Leslie, M., M. Wise, W.R. Warttig. 1997. Deactivation Standards and Guidelines, Appendix I and II. Ministry of Forests, Pacific Region.
- Murphy, M.L., J. Heifetz, J.F. Thedinga, S. W. Johson, and K.V. Koski. 1989. Habitat utilization by juvenile Pacific Salmon (*Oncorhynchus*) in the glacial Taku River, southeastern Alaska. Canadian Journal of Fisheries and Aquatic Sciences 46:1677-1685
- Nehlsen, W., J.E. Williams, and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. Fisheries 16(2)4-21

- Nickelson, T.E., J.D. Rodgers, S.L. Johnson, and M.F. Solazzi. 1992. Seasonal changes in habitat use by juvenile coho salmon (Oncorhynchus Kisutch) in Oregon coastal streams. Canadian Journal of Fisheries and Aquatic Sciences 49:783-789
- Poulin, V.A., C. Harris, and B. Simmons. 2000. Riparian Restoration in British Columbia: What's Happening Now, What's Needed for the Future. Ministry of Forests, British Columbia.
- Prichard, D. 1993. Riparian area management area: process for assessing proper functioning condition. U.S. Dept. of the Interior, Bureau of Land Management, TR1737-9, Denver Co. 51 pp. US Department of the Interior.
- Report 5. April 1995. Sustainable Ecosystem Management in Clayoquot Sound, Planning and Practices. April 1995
- Schlosser, I.J. 1991. Stream fish ecology: a landscape perspective. Bioscience 41:704-712
- Thomas, J.W., and the Forest Ecosystem Management Assessment Team. 1993. Forest ecosystem management: and ecological, economic, and social assessment. Report of the Forest Ecosystem Management Assessment Team. United States department of Agriculture, Forest Service, Portland Oregon.
- Williams, J.E., and seven co-authors. 1989. Fishes of North America endangered, threatened, or of special concern. Fisheries 14(6):2-20

APPENDIX 1, Wood Debris Placement SOP

KWRP S.O.P. – Wood Debris Placement

In-Stream Work Methods – June 22, 2005

This SOP is a general description based on past monitoring of six years of projects. The objective is to provide workers, agencies and partners with a basic understanding of the restoration process in historic logging debris laden streams.

- The LWD recovery should address two functions Cover and Scour. Some sites may offer both cover and scour while at others only one.
- Cover is an objective that maximizes the shade and complexity of instream and over stream wetted areas. The structure should be a stable instream refuge for fry and adults and contribute where necessary to overhead cover to reduce solar radiation and predator observation. It offers secondary habitat for birds, mammals, amphibians and invertebrates. Cover LWD can be constructed from any size or shape of LWD, preferably in clusters.
- Scour is a function that creates pools or gravel bars though LWD placed to constrict and or deflect flow. These structures require more specific anchoring and placement than cover to ensure they function and resist the forces of water.
- Utilize SWD such as treetops, large limbs and slabs in bundles to mimic LWD.
- Most LWD structures only need removal of SWD pieces to return functionality. Where there is a high degree of SWD and little LWD, make use of the bundling of SWD or import LWD to the site.
- If LWD pieces float free during the removal of non-embedding SWD, cable it in place in the nearest functional site. Mimic Sec. 9 examples where possible. A guideline of 25% removal of woody debris should be considered.
- Do not remove embedded pieces of LWD or SWD, their locations are to be designed around and disturbance may release sediment or poisonous gases.
- Restoration involves maintenance; our sites must be re-visited to ensure they remain anchored and functioning. The first year after restoration is the most important for removal of SWD and re-anchoring or tightening of cables as necessary. Often the embedded SWD from the year previous is dislodged due to channel scour. Maintenance involves a short time period but is necessary.
- Look for LWD sources in the forest/floodplain that can contribute to the stream habitat.
- Work with Riparian Treatment specialists for sources of trees to fall in the riparian zone for LWD sources (must be organized through Warren Warttig, RPBio of Interfor).
- Where possible, to minimize helicopter removal of SWD, make use of SWD waste by building piles in the forest for wildlife above the active floodplain. Duckbill or cable a perimeter of LWD around SWD piles to prevent escapes back into the creek in wide floodplain areas or steep slopes.
- Create clustered LWD complexes rather than separate pieces to offer better function.
- SWD may be cut for ease of removal but refer to Work In Stream SOP. Never cut LWD without permission from a supervisor.

APPENDIX 2, Spawning Gravel Placement SOP

S.O.P.

2005 KWRP Spawning Gravel Placement

Gravel:

- Washed (Clean) round rock,
- Coho/Cutthroat-Rock size should be a mixture ranging from 1/4 to 2 $^{1/2}$ inch Gravel with 10 % Cobble and Boulders at larger sites.
- Chinook/Chum-Rock size should be a mixture ranging from 2 to 5 inches Gravel, with a 15% mixture of Cobble (8 to 10 inches).
- When in doubt on gravel size, try to match original or near by substrate

Placement Sites:

- Areas of existing scour where there has been sufficient scour to remove organics and there is insufficient natural gravels,
- Tail out of pools,
- Areas of sufficient depth for water cover at low flows.

Placement Amounts:

- Depth 4" in 0.5 to 4.0 m wide channel width (take caution not to exceed winter low flow stream depths),
- Depth 6" in > 4.0 m wide channel width,
- Length equal to channel width.

Here are some of the guiding principles used for gravel placement in small, low gradient, streams.

***Gravel Size**:* This depends on the gradient and peak flow of the creek and target fish species. Low gradient, narrow width streams are likely coho/cutthroat sites. Higher gradient or lower reaches of a mainstem are likely Chinook/chum sites. Sizes can be determined from observation of native gravel in the area. Species utilization is also a factor. Gravel should be suitably mixed and complex sizes similar to the historic condition for the stream reach. Typically small coho/cutthroat/chum streams require washed 1/4 to 2 1/2 inch round rock with a mix of 10 % cobble and a few boulders as well. The cobble acts to create aeration sites for the substrate, as well as invertebrate habitat. The boulders facilitate aeration, invertebrate and emergent fry habitat while helping to stabilize the entire bed.
***Sites**:* Gravel sites are located in glides, riffles and pool tail outs. Do not place in pool bottoms. Select sites that offer 1-3 ft per second water velocity during spawning. This can be found natural or enhanced by creation of "quicks" through LWD and Boulder placement along the banks. Small streams are easiest. Streams wider than 5 meters have complex thalwegs and placement can be more difficult to determine and should be done with site by site prescriptions.
Many glides can be made into spawning riffles by the addition of control structures at the downstream end. ie logs, boulder or cobble. This material must be sized large enough to hold the gravel in place and prevent washout, again use existing native substrate as a guide.
***Substrate**:* The site substrate should be relatively impermeable and firm such as gravel, hardpan or clay. Avoid placement on soft substrates such as mud as the gravel will quickly become embedded. Some removal of sticks, mud, instream vegetation or dirty gravel is allowed, too much indicates a poor site selection.
***Depth**:* Gravel depths of 1/10th of channel width are a good rule of thumb. This places the gravel in depths similar to the natural, healthy, stream sites. Too much gravel may wash out then fill pools or create dry areas at low flow. The material must be submerged during low winter flow.
***Width & Length**:* Place gravel in square shaped deposits with lengths equal to the channel width. Most spawning areas in low gradient (0-2%) streams are one channel width long and wide. Exceptions are long riffles created by confined channels with less than the reach average width or areas of higher gradient. Do not spread it wider than the low flow margins along each bank and ensure a thalweg by spreading it in a shallow "vee" with a rake or with boots.

D. Clough & W. Warttig

APPENDIX 3, Riparian Vegetation Types Template

APPENDIX 4, Nutrient Sampling SOP

S.O.P.
Water Nutrient Sampling

Sample Timing:

- July/August
- Preferably 2 samples/site, spread over two weeks
- Water sample should arrive at lab within 24 hours of sample being collected

Sample Amount/Location:

- Sample should be collected in a clean container supplied by lab
- Lower and mid mainstem/major tributary
- Rough costs are approximately $100/sample

Information Required From Lab:

- Low level dissolved nitrate nitrogen (NO_3N)
- Low level dissolved soluble reactive Phosphorus (SRP)
- Low level dissolved total Phosphorus (TP)

Levels of concern for dissolved nutrients are:

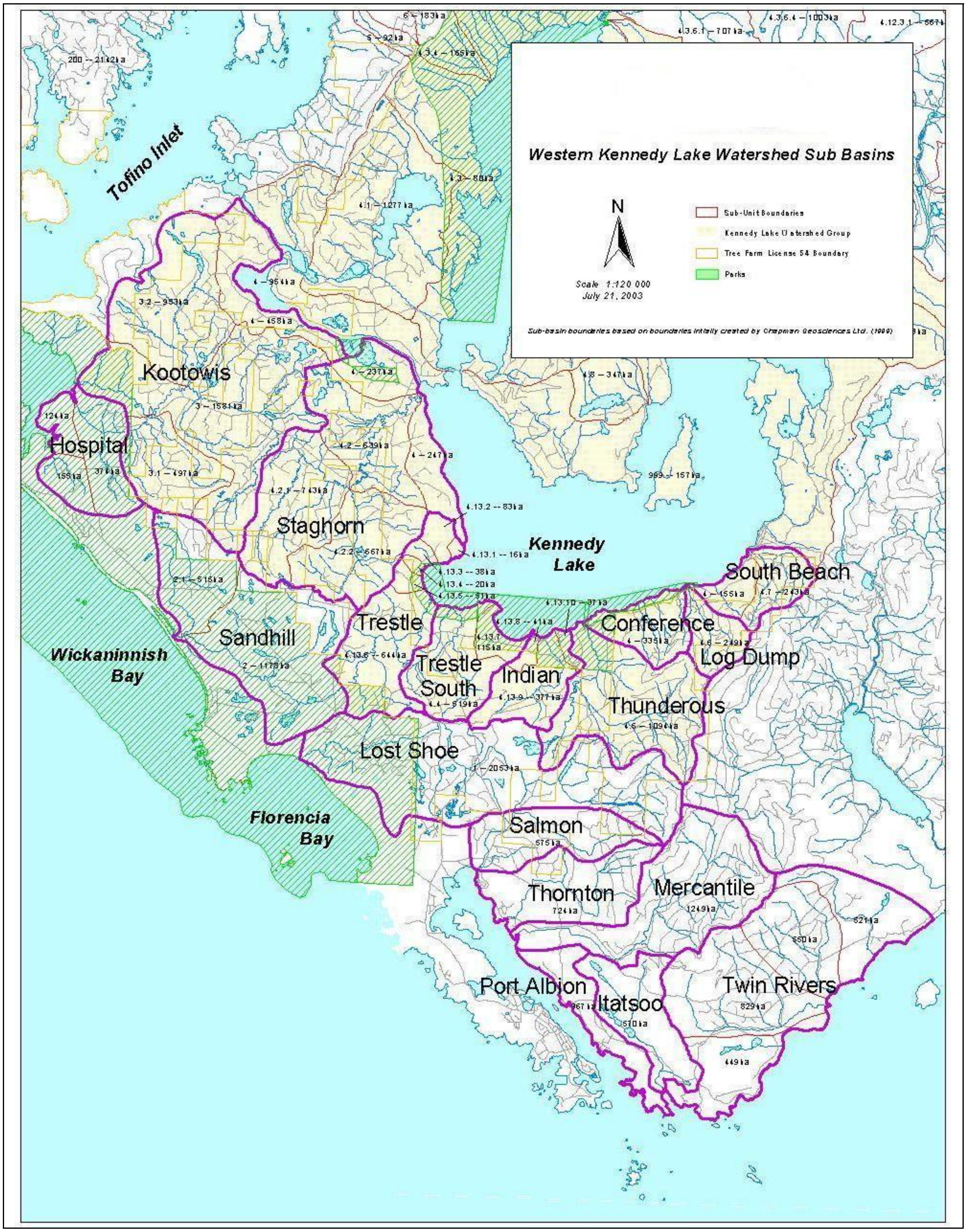
- < 20 ug/L NO_3N
- < 1 ug/L SRP
- < 5 ug/L TP

Site indicators of poor nutrients:

- Significant incident (>10%) of age 1+ Coho instream
- Numerous 1+ Coho (smolting at 2)
- Small size 0+ Coho in August/September (< 5g)
- Small 1+ Trout parr (,80-90 mm)

APPENDIX 5, Kennedy Flats Stream Risk Summary

APPENDIX 6, 1:90,000 Kennedy Flats Sub-Basin Map


Western Kennedy Lake Watershed Sub Basins
N
Sub-Unit Boundaries
Kennedy Lake Watershed Group
Tree Farm License 54 Boundary
Parks
Scale 1:120 000
July 21, 2003
Sub-basin boundaries based on boundaries initially created by Chapman Geosciences Ltd. (1999)
Tofino Inlet
Kootowis
Hospital
Staghorn
Kennedy
Lake
South Beach
Conference
Log Dump
Trestle
Sandhill
Wickaninnish
Bay
Trestle
South
Indian
Thunderous
Lost Shoe
Florencia
Bay
Salmon
Thornton
Mercantile
Port Albion
Itatsoo
Twin Rivers

APPENDIX 7, 1:22,000 Stream and Road Maps